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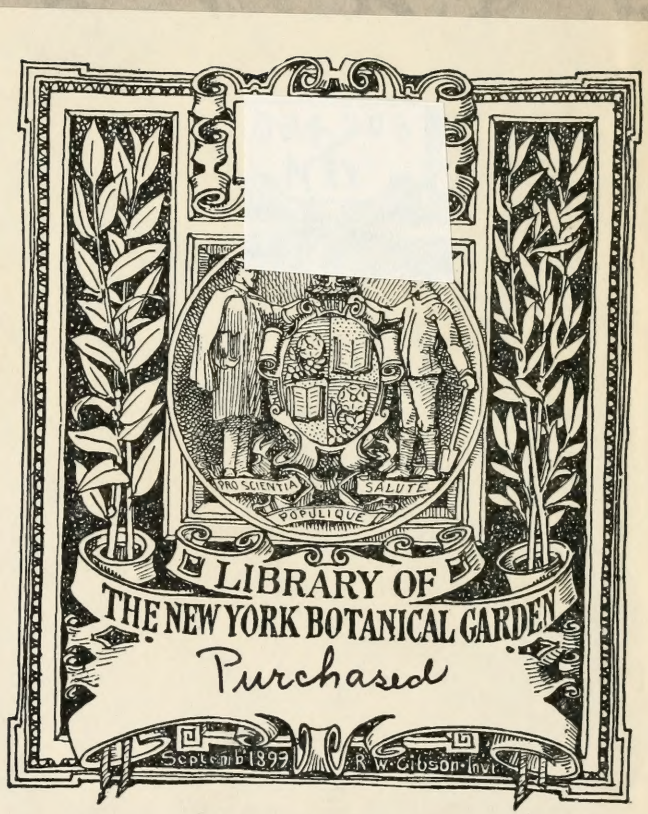
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NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

FIRST ANNUAL MEETING

NEW YORK CITY

NOVEMBER 17, 1910

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The proceedings of this meeting were those of organization only. A report will be found on pages 8 and 9 of the Report of the second meeting.

NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

SECOND ANNUAL MEETING

ITHACA, NEW YORK

DECEMBER 14 AND 15, 1911

MR. HENRY HALES

OF RIDGEWOOD, NEW JERSEY

And the Original Hales' Paper Shell Hickory Tree

NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

SECOND ANNUAL MEETING

ITHACA, NEW YORK

DECEMBER 14 AND 15, 1911

PRESS OF THE ITHACA JOURNAL
ITHACA, NEW YORK
1912

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Secretary and Treasurer	W. C. Deming	Westchester, New York City

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W. N. Roper
And the Officers

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E. R. Lake
J. G. Rush
W. N. Roper

On Promising Seedlings

T. P. Littlepage
C. A. Reed
W. C. Deming

On Nomenclature

John Craig
R. T. Morris
W. C. Deming

On Hybrids

R. T. Morris
Henry Hicks
C. P. Close

On Press and Publication

W. N. Roper
T. P. Littlepage
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Womack, B. F., Ancon Canal Zone, Panama.

*Honorary member. †Life member.

Constitution and Rules of the Northern Nut Growers Association.

Name. The society shall be known as the Northern Nut Growers Association.

Object. The promotion of interest in nut-producing plants, their products and their culture.

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the approval of the committee on membership.

Officers. There shall be a president, a vice-president, and a secretary-treasurer; an executive committee of five persons, of which the president, vice-president and secretary shall be members; and a state vice-president from each state represented in the membership of the association.

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the subsequent year.

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

Discipline. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

Committees. The association shall appoint standing committees of three members each to consider and report on the following topics at each annual meeting: first, on promising seedlings; second, on nomenclature; third, on hybrids; fourth, on membership; fifth, on press and publication.

The Northern Nut Growers Association

SECOND ANNUAL MEETING

THURSDAY, DECEMBER 14, 1911, 10 A. M.

Room 191, New York State College of Agriculture,
Ithaca, New York.

President Morris: The meeting is called to order and I will first ask Professor Craig to make a few remarks on behalf of the College Director and the President of the University.

Professor Craig: It is my privilege and pleasure to welcome the representatives of the Northern Nut Growers' Association in this, their second annual meeting, to the New York State College of Agriculture. I regret exceedingly that Director Bailey, who has been avoiding out of state engagements this winter quite generally, made one about two months ago for this day, about a thousand miles away, which makes it absolutely impossible for him to be with us. He regretted this very much, and asked me particularly to impress upon you the idea that he was most anxious that this Association should meet here, and that all the facilities of the College of Agriculture should be placed at your disposal, for the purpose of making your meeting as profitable and as pleasant as possible.

President Schurman, whose time at this period of the year is much monopolized and who is by previous engagements occupied very completely this morning, has asked me to say to you that he hoped to be able to come over and join us informally some time during the afternoon. I wish then to impress the thought that, although the official representatives of the University and College are not with us, they have not forgotten this meeting. As a member of the Executive Committee, in charge of the sessions, I have made up a tentative program for this morning for the purpose of starting the meeting off; and as the President will undoubtedly tell you later on, this program is subject to revision and change according to the convenience of the members. It is proposed to occupy this morning with regular program subjects, and it has been suggested that this afternoon we take a couple of hours' leisure which we may use in examining the exhibits or in viewing the University, if you care to consider that an exhibit worth while. It will be our pleasure to furnish guides for those who desire to make an excursion around and through the University buildings.

Let me say in conclusion that I hope you will make use of the opportunities and facilities that are at your full disposal. The Department of Horticulture is located on the second floor. I would like you to make that office your headquarters, and make use of our clerical force, and such facilities as are available, to the fullest measure possible, so that your visit will be pleasant, as I am sure it will be profitable.

President Morris: The next order of business will be the report from the Secretary-Treasurer, and the report of the last meeting.

Doctor Deming: A meeting for organization of Northern Nut Growers was held, on the invitation of Dr. N. L. Britton, at the Botanical Museum in Bronx Park, New York City, on Nov. 17th, 1910.

Dr. Britton called the meeting to order, stated its purpose and presented specimens.

Those present were:

Dr. N. L. Britton, Director N. Y. Botanic Gardens.
Dr. Robert T. Morris, 616 Madison Ave., New York City.
Prof. John Craig, of Cornell University.
Mr. T. P. Littlepage, Union Trust Building, Washington, D. C.
Mr. A. B. Malcomson, Orange, N. J.
Mr. Henry Hales, Ridgewood, N. J.
Mrs. Joseph L. Lovett, Emilie, Bucks County, Pa.
Mrs. Yardly (with Mrs. Lovett).
Dr. Geo. Knapp, (at the request of Simpson Bros., Vincennes, Ind.) 21 Claremont Ave., New York City.
Mr. C. A. Schwartze, 92 Stagg St., Brooklyn, N. Y.
Mr. Nash, of the Botanical Museum.
Dr. W. C. Deming, Westchester, New York City.

On the retirement of Dr. Britton Dr. Deming acted as temporary chairman and read a number of letters from persons interested in nut culture encouraging the formation of an association.

The chairman appointed Prof. Craig, Dr. Morris and Mr. Littlepage a committee to draw up a tentative constitution or set of working rules until permanent organization could be effected. The committee made the following report which was adopted with the understanding that the executive committee should consider the question of constitution and by-laws and report at the next regular meeting.

Name. The society shall be known as the Northern Nut Growers Association.

Object. The promotion of interest in nut-producing plants, their products and their culture.

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality.

Officers. There shall be a president, a vice-president, a secretary-treasurer and an executive committee of five persons, of which latter the president and secretary shall be members.

Meetings. The association shall hold an annual meeting on or about Nov. 15 and such other special meetings as may seem desirable, these to be called by the president and executive committee.

Fees. The fees shall be of two kinds, annual and life. The former shall be $2.00, the latter $20.00.

In addition to the large number of letters showing a wide spread interest in nut growing, communications of especial interest were received from Prof. W. N. Hutt, State Horticulturist of North Carolina, Mr. W. N. Roper, former editor of the American Fruit and Nut Journal, and from Mr. Henry Hicks of Westbury, Long Island.

The election of officers resulted as follows:

President—Dr. Robert T. Morris, New York City.

Vice-President—Mr. T. P. Littlepage, Washington, D. C.

Secretary-Treasurer—Dr. W. C. Deming, Westchester, New York City.

Executive Committee: Prof. John Craig, Cornell University; Henry Hales, Ridgewood, N. J.; Prof. C. P. Close, College Park, Md.

Exhibits of nuts, nut literature, trees, grafting methods, a budding tool, etc., were received and shown from nineteen different contributors. A detailed account of these has been published and is on file.

The following resolution, introduced by Mr. T. P. Littlepage, was unanimously adopted:

Resolved, that the Northern Nut Growers' Association express its appreciation of the attitude of the National Nut Growers' Association in encouraging the organization of associations which have for their purpose the development of the nut industry, and we hereby pledge our support to, and our cooperation with, said National Nut Growers' Association. And be it further

Resolved, that we hereby acknowledge our great obligation to the many pineer nut growers of the South who have done so much to put nut culture on a scientific basis, and that we express to them our deep gratitude for the fund of valuable information and data which they have worked out and made available.

The meeting then adjourned.

The Secretary-Treasurer has received for membership fees $108.00, and expended for postage, printing and stationery, telephone and telegrams, $59.27. Remaining in treasury, $48.73.

The following leaflets were issued during the year:

A reprint of Dr. Morris's article "Nut Culture for Physicians."

A list of societies, books and other publications devoted to nut culture.

A list of some of the chief nurserymen carrying nut trees in stock.

The President also published in the Garden Magazine for May an article on nut culture, in which he referred to our organization, as a result of which some 45 letters of inquiry were received by the secretary, covering the country from Canada to Texas and from British Columbia to Panama.

The leaflets, and notices of the annual meeting, have been sent to about 321 addresses, including the members, agricultural journals, nurserymen and nut dealers, government and state officials, state horticulturists, correspondents and persons who it was thought might be interested.

The following letter was sent to 21 leading nurserymen:

"The President of our association, Dr. Robert T. Morris of New York, asks me to suggest to you that it might be well for your firm, or some member of it, to join the association, to be present at the meetings and to take up the matter of raising such nursery stock as is in constant and growing demand by the members. We need to be in touch with those who are growing things commercially and if they are present at the meetings they will know what we want. The national association is largely made up of professional nurserymen."

Nov. 15, 1911.

Two nurserymen have accepted the invitation. Evidently the others do not yet think the northern nut grower one whose acquaintance is worth cultivating. We hope to convince them to the contrary.

The following letter has been sent to the state horticulturists of the northern states and the provinces of Canada.

"The Northern Nut Growers' Association desires your interest, your aid and advice, your membership and, if possible, your attendance at the meetings.

It would also be of help to the association in its work if you would give it information of those persons in your state who are interested in nut culture."

Nov. 15, 1911.

Cordial replies have been received from M. B. Cummings, Secretary of the Vermont Horticultural Society; from Le Roy Cady, Chief of the Division of Horticulture, Minnesota Agricultural Experiment Station; and from J. H. Foster, Professor of Forestry, New Hampshire Agricultural College.

Fifty postal card reminders of this meeting were sent to members and others a week ago.

The secretary has also made investigation by correspondence on the hickory bark beetle and the identity of *Juglans mandshurica*.

The response from all communications to the various officials of the Department of Agriculture at Washington has been prompt, cordial, interesting and helpful. This should certainly be very encouraging, if encouragement is needed, coming from men likely to be far-seeing as to the needs for, and the possibilities of, nut culture. Prof. Frederick V. Coville is conducting experiments in rooting hickory cuttings sent by the secretary. Prof. Walter Swingle offers his cooperation in experiments in propagation.

The general correspondence received by the secretary shows an interest and an enthusiasm that reveals the growing appreciation of the importance of the purposes for which this association stands.

(The following figures are brought up to date of going to press.)

Eighteen of our 60 members are from New York, 8 from Connecticut, 6 from Pennsylvania, 4 from New Jersey and Illinois, 3 from the District of Columbia, 2 each from Indiana, Virginia and Minnesota, and one each from Massachusetts, Ohio, Georgia, Louisiana, Florida, Colorado, Kentucky, Michigan, Oklahoma, Panama and Canada. Thus seventeen states, the District of Columbia, Panama and Canada are represented in our membership.

Eight of our members are women, one of them a life member, nine are professional nurserymen, eight are physicians, six are connected with educational institutions, three are lawyers, five agriculturists, two at least are capitalists, and all expect to be, two are in literature and there are one each of the following: clergyman, painter, insurance, secretary, railroads, senator.

The national association has 273 members of whom 52 are from the northern states. We ought to have all of these.

The secretary is keeping a record of the scattered articles, communications to agricultural journals and other literature relating to nut growing. He would consider it a favor if the members would send him information of anything of this kind that may come to their knowledge.

Mr. Littlepage: I move that the report of the Secretary-Treasurer be approved.

Professor Craig: I second that motion. I would like to add just a word, to the effect that it seems to me that the Secretary has started out in a very promising manner. He has not merely performed the routine duties of the secretary, but he has studied the case, and has presented in an analytical and striking form a good many facts not apparent on the surface, had he only given us the stereotyped matter in the conventional way; and it seems to me that this augurs well for the future of the Secretary's office. I trust he can keep up the gait. (Carried.)

Professor Craig: May I say that it seems to me there are one or two matters arising out of the Secretary's report which are worthy of special action? One is the question of the invasion of the scolytus beetle; the other is the nomenclature of *Juglans mandshurica*. It occurs to me that it might be well to appoint committees on these subjects to report during the sessions of the society. I might say on the scolytus matter, that I have conferred with Professor Comstock, who has been kind enough to say he would place the matter in the hands of one of his assistants, who will present to the society the latest we have on that subject; and in the event of a committee being appointed, I would suggest that that person, Professor Herrick, be made the chairman of that committee.

President Morris: I will appoint Professor Herrick and Professor Craig on the scolytus committee, and on the nomenclature committee I will appoint Doctor Deming and Mr. Barron.

In this connection, I will have to say, however, that I neglected to bring my correspondence relating to the nomenclature of *Juglans mandshurica*. I can say a word that the committee may wish to use. For a long while, I have been trying to trace the origin of the name *Juglans mandshurica*. It is applied to two different nuts. The one described in the United States government bulletin is the nut originally described by Maxim as *Juglans mandshurica* more than thirty years ago. That nomenclature has priority for two reasons: first, because of the date, and in the second place, because of the recognized standing of Maxim as a botanist. The Yokohama Nursery Company has been sending out a very different nut which they call *Juglans mandshurica*, evidently of the race of *Juglans regia*. The *Juglans mandshurica* of the government bulletin is like the butternut, the *Juglans mandshurica* of the nursery companies is evidently a race of *Juglans regia*. I have conferred with Doctor Britton, Sargent, and other authorities, and we have never been able to trace the name given to this walnut of the *Juglans regia* type, *Juglans mandshurica*, until by accident I happened to get word from the Yokohama Nursery Company to the effect that they had made up that name in the office a few years ago, not knowing

that a previous *Juglans mandshurica* existed and had been named by Maxim. So that traces the rodent to its hole. The name *Juglans mandshurica* by Maxim is the proper name for the worthless butternut-like nut from China. De Candolle named the valuable walnut that has been sent out by the Yokohama Nursery Company *Juglans regia sinensis*. So both of these nuts have been previously named, and by authority.

Professor Craig: It is a question, then, of priority.

President Morris: Yes, a question of priority; but really the Yokohama Company had no right to make up that name. It was simply made up in the office as a matter of trade convenience, and they attached to this *Juglans regia* nut a name that had been applied to an entirely different nut, not knowing that this name had been previously applied. So there is a *Juglans mandshurica* and a *Juglans regia sinensis*, respectively.

Mr. Littlepage: Is the walnut, *Juglans mandshurica*, which you have been discussing, similar to the ordinary butternut of the Middle West, the Indiana white walnut?

President Morris: You can find nuts much alike on first inspection, but the mandshurica nut has six ridges in addition to the suture ridges. The leaf of *Juglans mandshurica* is sometimes a yard in length, with twenty-seven to thirty-one leaflets, sometimes—an enormous tropical leaf. The nut is usually too small to be valuable.

Mr. Littlepage: I have seen the butternut of the Middle West nearly similar, but it grows on the ordinary tree with white bark, and has small leaves.

President Morris: The general outline of the nut is about the same in both, but the air chambers are very much larger in the *mandshurica* than they are in the butternut and there is a marked difference in the flavor. You can distinguish them readily enough.

Mr. Littlepage: The butternut grows wild throughout the Middle West, usually along small water courses and alluvial lands. There are perhaps one hundred and fifty on a creek corner on one of my farms.

President Morris: They are very plenty here at Ithaca. In fact, you will find them in Maine and Nova Scotia.

Mr. Littlepage: I saw them in Michigan.

President Morris: I will state, that from two until four the members will view the collections, and make the tour of the Campus buildings. During that time the report on competition, or at least examination of specimens in competition, should be made, and I would like to appoint Professor Reed and Mr. Littlepage on that committee, and I will serve as *ex-officio* member of the committee. The other committees I can make up a little later. The next order of business will be the President's address. Mr. Littlepage, will you take the chair?

THE HICKORIES.

Robert T. Morris, M. D.

So far as we know, the hickories, belonging to the Juglandaceae, are indigenous to the North American continent only. Representatives of the group occur naturally from southern Canada to the central latitude of Mexico, in a curved band upon the map, which would be bounded upon the east by the Atlantic Ocean and the Gulf of Mexico, and on the west roughly by the Missouri River, until that river bends east from the eastern boundary of Kansas. From the angle of that bend the hickory runs approximately southwest into Mexico.

The exact number of species has not been determined as yet, because of the open question of specific or varietal differences in some members of the family. Sargent's classification at present includes eleven species: Hicoria pecan, H. Texana, H. minima, H. myristicaeformis, H. aquatica, H. ovata, H. Carolinae-septentrionalis, H. laciniosa, H. alba, H. glabra, and H. villosa. To this list may be added H. Mexicana (Palmer), which so far seems to have been found only in the high mountains of Alvarez, near San Louis Potosi in Mexico; and H. Buckleyi from Texas, which was described once by Durand, and since that time overlooked by writers, excepting by Mrs. M. J. Young in 1873, who included the species in her "Lessons in Botany." Professor Sargent tells me that the Buckley hickory will be included in the next edition of Sargent's "Manual of the Trees of North America." This brings the number of species up to thirteen. In addition we have well marked varieties: H. glabra odorata, H. glabra pallida, and H. glabra microcarpa, making sixteen well defined hickories that have been described.

Nuts of all of these hickories are in the collection of "Edible Nuts of the World" at Cornell University, with the exception of nuts of the varieties H. glabra odorata and H. glabra pallida.

In addition to the sixteen described varieties and species of hickories in America, we have an endless variety of hybrid forms, because cross-pollenization seems to take place readily between hickories of synchronous flowering time.

Five of the hickories: H. pecan, H. Texana, H. minima, H. myristicaeformis, and H. aquatica belong to the open-bud group, while the rest belong to the scale-bud group. The winter buds of the open-bud group resemble the winter buds of the walnuts in a general way, and in artificial hybridization experiments I seem to note a close relationship between the open-bud hickories and the walnuts.

There is no more promising work for the horticulturist than cross-

ing hickories with walnuts, and crossing hickories with each other. Five hundred years from now we shall probably find extensive orchards of such hybrids occupying thousands of acres of land which is now practically worthless. The hickories are to furnish a substantial part of the food supply of the world in the years to come. At the present time wild hickories held most highly in esteem are: H. pecan, H. ovata, H. Carolinae-septentrionalis, and H. laciniosa. Several other kinds have edible kernels, sometimes of excellent character, but not readily obtained except by boys and squirrels, whose time is not valuable. In this group we have H. alba, H. glabra, H. villosa, H. glabra pallida, H. glabra odorata, H. glabra microcarpa, H. Mexicana, H. Buckleyi, and H. myristicaeformis. In another group of hickories with temptingly thin shells and plump kernels, we have a bitter or astringent pellicle of the kernel. This group contains H. Texana, H. minima, and H. aquatica. Sometimes in the bitter group we find individual trees with edible nuts, and it is not unlikely that some of them represent hybrids in which the bitter and astringent qualities have been recessive.

Among the desirable species of wild hickories there is much variation in character, and selection of trees for propagation is in its infancy. One reason for this has been the difficulty of transplanting hickories. Another reason is the fact that hickories do not come true to parent type from seed. A third reason is the length of time required for seedling hickories to come into bearing.

Concerning the first reason, the enormous taproot of young hickories requires so much pabulum for maintenance that when the trees are transplanted, with destruction of root-hairs along with the feeding roots, transplanted stocks may remain a year or two years in the ground before they are ready to send out buds from the top. On this account, the Stringfellow method has in my locality proven of value. This consists in extreme cutting back of root and top, leaving little more than a short club for transplantation. The short club does not require much pabulum for maintenance, and new feeding roots with their root-hairs get the club under way quickly, because there is little useless load for them to carry. The Stringfellow method further includes the idea that stock should be planted in very hard ground, and seems to be practicable with the hickories. The root-hairs which take up nourishment from the soil find it difficult to carry on osmosis in loose soil. The close contact obtained by forcing a way through compact soil facilitates feeding. On this account, autumn is perhaps a better time for transplantation of hickories, in the northern latitudes, at least. Callus forms over the ends of cut roots at all times when the ground is not frozen, and the more complete the callus formation the more readily are feeding roots sent out.

One of the main obstacles to propagation of hickories has depended upon the fact that nuts did not come true to parent type from seed. This is overcome by budding or grafting, and we can now multiply the progeny from any one desirable plant indefinitely. In the South grafting is nearly as successful as budding, but in the North budding seems to be the better method for propagation. The chief difficulty in grafting or budding the hickories is due to slow formation of callus and of granulation processes which carry on repair of wounds.

The propagation of trees from a desirable individual plant can be accomplished also by transplanting roots. A hickory root dug from the ground, divested of small rootlets, cut into segments a foot or more in length, and set perpendicularly in sand with half an inch protruding, will throw out shoots from adventitious buds. In my experimental work with hickory roots, in covered jars, surrounded by wet moss, but with the entire root reached by light, adventitious buds have started along the entire length of the root, and we may find this an economical way for root propagation, dividing up sprouting roots into small segments. The chief objection to this method of propagation as compared with budding is the length of time required for seedling trees to come into bearing, propagation from roots probably requiring the same length of time as propagation from seed, whereas by budding or grafting the bearing period begins very much earlier. Forty-six years ago Mr. J. W. Kerr of Denton, Maryland, planted three pecks of large shagbark hickory nuts, but of the progeny only about twenty were satisfactory, most of the trees bearing inferior nuts. These trees required from thirteen to eighteen years to come into bearing, and young trees that Mr. Kerr purchased from nurseries and planted were twenty-five years old before they began to bear. Others who have planted shagbark hickories and pecans state that nearly twenty years are required for the trees to come into bearing on an average. When budded or grafted the pecan sometimes comes into bearing in two years, and frequently in four years. We may anticipate that other hickories will act analogously.

The hickories prefer rich, well drained soil for best development of nuts, and an abundance of moisture, provided the land is well drained. Many of the hickories, however, are so adaptable to various soils that they often thrive in lands that are sandy, and dry, and almost barren. In the latter case, they have to maintain an enormous root system for feeding purposes, and this is detrimental to good bearing qualities. The mocker-nut, pignut, and hairy hickory, perhaps adapt themselves best to sandy soils. This feature may make them valuable species for planting when one has no other soil, because the stocks can be used for grafting better kinds.

While the hickories prefer neutral or alkaline soil, most of them

will grow fairly well even in acid glacial tills. Their preference, however, for neutral or alkaline soils would suggest the use of a good deal of lime in acid soils, when hickories are to be grown in orchard form.

All of the trees in the hickory group are intolerant of shade and of competition with other trees. The more sunlight they can have the better. Most of us are familiar with the hickory tree standing alone in the cultivated field, which bears a heavy annual crop, when the neighbors at the edge of the forest bear sparingly. Hickories in forest growth put their energies into the formation of wood chiefly, and in the struggle for food and light devote very little energy to fruiting.

The best method for cultivation of hickories has been worked out only with the pecan up to the present time. With this species, it has been determined that clean cultivation with plenty of fertilization gives best results, as with apples. It is probable that Stringfellow's sod culture method will come next in order, and will perhaps be most generally used by nut orchardists, because it is less expensive and requires less labor. The sod culture method includes the idea of cutting all grass and weeds beneath the trees, in order to take away competition, allowing these vegetable substances to decompose beneath the trees and furnish food. There is no objection to adding artificial fertilizer, or a still greater amount of vegetable matter.

The enemies of the hickories are not many in the forest, where the balance of nature is maintained, but when man disturbs the balance of nature by planting hickories in large numbers in orchard form certain enemies increase, and must be met by our resources. Fungous and bacterial enemies are beginning to menace some varieties of the pecan in the South, and both in the North and in the South certain insect enemies are becoming important in relation to all valuable hickories.

The bark boring beetle (Scolytus) has been reported as destructive to hickories in some sections, the trees dying as a result of depredations of the larvae of this beetle.

I find a large borer at work on some of my hickories, but have not as yet determined its species. It may be the painted hickory borer (Cylene), or the locust borer. It makes a hole as large as a small lead pencil, directly into the trunk or limbs, and excavates long tunnels into the heart wood. The painted hickory borer is supposed to occur chiefly on dead and dying hickories, but the borer of which I speak is found in the vigorous young hickories in the vicinity of my locusts, which are riddled with locust borers.

In some localities involucre borers make tunnels between the nut and the involucre, interfering with the development of the kernel.

The hickory twig girdler (Oncideres) is abundant in some localities, but not as yet very destructive.

Hickory nut weevils destroy many nuts in some localities, and their colonies increase about individual trees markedly. In such cases, it is important to collect the entire crop each year from a given tree, taking pains to destroy all nuts which contain weevil larvae. These may be selected in a general way by dumping the freshly gathered nuts into a tub of water. Nuts containing weevil larvae will float for the most part, and in order to make sure of the destruction of larvae in the remaining nuts they may be placed in a closed receptacle, and carbon bisulphide poured over them.

One of the bud worms is sometimes very destructive to individual hickory trees which have developed colonies, the larvae destroying the axillary buds, and burrowing into the base of the petioles of leaves.

A new enemy which I found this year for the first time is the *Conotrachelus juglandis*. This beetle ordinarily lays its eggs in the involucre of the butternut. With the introduction of exotic walnuts, the beetle has changed its habits, and lays its eggs in the herbaceous shoots of walnuts and hickories. The larvae tunnel into the center of a shoot, and destroy it, or seriously interfere with its nutrition.

Among the enemies of the hickory we must not forget the common field mouse, and the pine mouse, which burrow beneath the surface of the ground, and in winter feed freely upon the bark of the roots of the hickories. They have destroyed many thousands of young hickories of various kinds in my nursery, and in digging up roots of old hickories for experimental root grafting I find that mice have been living freely for years upon the bark of some roots.

RANDOM NOTES

Aside from the facts which have been grouped together in this paper, certain notes may be of interest, as introducing questions for speculation.

Are we likely to find more species among the hickories than the ones already described? If so well described a species as the H. Buckleyi has almost escaped observation, and if H. Mexicana is confined, as it seems to be, to a very limited area, and if most of the hickories grow in regions where few botanists are at work, it seems to me probable that several species remain as yet undiscovered. These are likely to be species which lack means of defence, and which are restricted to certain small areas. If we make a parallel with other observations of recent discoveries, one thinks, for instance, in Ichthyology of the Marston's trout, the Sunapee sabling, Ausable greyling, and the Kern River trout, confined almost to a certain stream or lake, and remaining undiscovered for years by naturalists, although familiar to thousands of local fishermen.

Sometimes there is a very apparent reason for the check to distribution of a species. The men whom I employed to go into the mountains of Alvarez for the Mexican hickory tell me that the trees are so loaded down with mistletoe that they rarely bear a crop, and there are few nuts with well developed kernels to be found.

Distribution of a powerful species of hickory, like the pecan, seems to be limited in the North by incomplete development of the pistillate flowers. These are borne on the ends of the herbaceous shoots of the year, and the pecan has such a long growing season that in the North the pistillate buds, which are last developed, are exposed to winter killing. Southern limitation of hickories which have a very short growing period, like the shagbark, may be due to the fact that after a period of summer rest, new growth begins in the autumn rains, and this new growth may not lignify for winter rest.

By artificial selection we can extend the range of all hickories far beyond their indigenous range, which is limited by natural checks. Extension of range, adaptation to various soils, and changes in the character of the nut are likely to occur from grafting hickories upon different stocks of the family. Thus we can graft a shagbark, which does not thrive in poor sandy soil, upon the mocker-nut, which does grow in such soils. Some varieties of the species may grow freely far out of their natural range if they are simply transplanted. For instance, the Stuart pecan, which comes from the very shores of the Gulf of Mexico, is one of the hardiest pecans at the latitude of New York. I don't know about its northern fruiting as yet.

If the Satsuma orange grafted upon trifoliate orange stock gives a heavy, well flavored fruit, while the same variety grafted upon sweet orange stock gives a spongy fruit of little value, we may assume that similar changes in character of fruit will follow nut grafting. Perhaps the astringent feature of the pecan nut will be found to disappear when the pecan has been grafted upon certain other hickories. Sometimes undesirable results are obtained from such grafting; for instance, the pecan grafted upon water hickory stock has been found to grow freely for four or five years, and then to die back unaccountably.

Stocks of rapidly growing hickories, like the pecan and the bitternut, may serve to shorten the bearing time of slowly growing species, like the shagbark, when scions of the latter are grafted upon such stocks. At the present time I have shagbark grafted upon stocks of the pecan, shagbark, bitternut, mocker-nut, and pignut, but these are all young, and I cannot at the present time discern much difference in effect of stock upon scion.

In cross pollenization of hickories, I have not as yet discovered the best way to prevent the development of aphides and of other insects

under the protection of the paper bags (which cover the pistillate flowers) sometimes to the point of destruction of flowers before nuts are started. It is probable that sprinkling the leaves with Persian insect powder, and leaving a little insect powder in the bag, will settle the question.

I have not as yet learned how to prevent squirrels from getting at hybridized nuts while they are still upon the tree. Squirrels cut through mosquito netting which is tied about nuts to prevent them from falling to the ground, and if wire gauze is used, they cut off the branch, allowing gauze and all to fall to the ground, and then manage to get the nut out of the gauze. The red squirrel particularly is a pest in this regard, and will even cut off the tape which is tied about the branches for marking purposes, for no apparent reason aside from pure mischievousness.

Nuts which are to be planted must be kept away not only from the squirrels, but from rats and mice. One of my farmhouses got the reputation of being haunted because of mysterious noises made by rats in rattling hybrid nuts worth a dollar apiece about between the partitions. The best way that I have found for keeping nuts for sprouting purposes is to have a number of large wire cages made. These are set in the ground, nuts are stratified in sand within these cages, and allowed to remain exposed to the elements during the winter.

It is probable that some of the hickories will be grown in forest form in future because of the increased value of the wood of the species. For growing hickories in forest form, it is probable that they should be set not more than six or eight feet apart at the outset. At ten years of age the first thinning will give a valuable lot of hoop poles. The second thinning will give turning stock. The third thinning will give wood for a large variety of purposes. I know of no tree which promises to return a revenue more quickly when planted in forest form than hickories like the shagbark and the shellbark, mockernut and pignut. These trees will not be expected to bear nuts, because in the struggle for food and light their energies will be directed toward making trunks.

Hickories are undoubtedly to be used for decorative purposes in parks and streets by future generations. The stately pecan, the sturdy shagbark, can be made to replace, South and North, the millions of useless poplars, willows, and other bunches of leaves, which please the eye but render no valuable annual or final returns. The chief reason why this has not been done is because people have not thought about it.

President Morris: This paper is not to be considered with the respect that is ordinarily due to a presidential address, but is open for discussion, and I would like to have any of my theories disproven.

Professor Craig: Doctor Morris has covered a very extensive field in his presidential address, and has raised so many interesting questions that I imagine the difficulty with you is to know just where to begin. Personally, and because I am not as thoroughly aware of the field of Doctor Morris' hybridization work as I ought to be, I should like to ask him what combinations of the hickories he has effected thus far. The field of hybridizing nuts is an exceedingly interesting one, and Doctor Morris has been the foremost worker in it. I am sure it would be interesting to you, as it is to myself, to know briefly what ground he has covered in the extensive range of his experiments.

President Morris: In answering that question, I am speaking from memory and may not speak correctly. I have made crosses back and forth between shagbark, bitternut, mocker-nut, pignut, and pecan. In the crosses I made, using pecans, pollen was received from the South and put upon the others. The number of crosses that are fertile I cannot state as yet, because I have not had experience enough in protecting these nuts, and many of the hybrid nuts were lost. Squirrels and mice destroyed the labor of three of my men and myself during one season. I have secured fertile hybrids between the pecan and the bitternut and between the pecan and the shagbark. If I remember correctly, those are the only fertile hybrids I have between hickories at the present time. In regard to crossing hickories and walnuts, I have crossed back and forth several of the walnuts, our black walnut, our butternut, the Siebold walnut, with the pecan, and with the bitternut, and have fertile hybrids. These are open bud hickories, and the open bud hickories seem to cross pollenize freely with the walnuts back and forth, while the scale bud hickories do not accept pollen readily from the walnuts. I would rather perhaps not make a report to this effect for publication at the present time, for two reasons. In the first place, I am speaking from memory; in the second place, rats, mice, squirrels, small boys, visitors, and high winds have made such inroads upon my specimens, and upon my work, that it is not quite time to report. I am merely speaking offhand in a general way, stating that the hickories, open bud and scale bud, both seem to cross rather freely back and forth. Open bud hickories and the walnuts seem to cross rather freely back and forth, while the walnuts and the scale bud hickories apparently do not cross so readily back and forth.

Professor Craig: In growing your hickories from root cuttings, have you had any trouble from excessive sprouting?

President Morris: Anywhere from one to eight sprouts will start from adventitious buds at the circle near the ground, and then I break all these off but one, letting that one grow.

Mr. Wilcox (Pennsylvania): How do you prepare your stocks for budding and grafting, in pots?

President Morris: I have tried practically every method that has ever been described, and the only successful method that I have now has been topworking vigorous sprouts of one year's growth. That is, I would cut off the tops of the trees now. Next spring those tops send out very vigorous sprouts. I bud those early in August or the latter part of July, or else in the following spring, sometimes, we graft them; and in grafting, it is quite important to cut longitudinally at one side of the stock, and go clear to the cambium layer. That gives the flexible slice on one side, and adapts itself to the tying.

Mr. Wilcox: Have you prepared any stocks in pots at all?

President Morris: Yes. I personally have to leave these to others. I tell my men to do it, but it is rather new work for them, and I give them so much to do that things are apt to be neglected; and just a moment of neglect at the wrong time will wipe out a whole year's work. I have not cared very much at the present time for root grafting in pots. I have lost a great proportion of the grafts, and it does not at the present time seem desirable; but I believe if that is done in hot houses with the ground warmed from the bottom, it is very apt to succeed. Give them plenty of time for granulating. They granulate very, very slowly.

Mr. Wilcox: What kind of pots do you use?

President Morris: Some Professor Sargent showed me, long, made for the purpose.

Mr. Collins (Pennsylvania): You spoke of the hairy hickory. What hickory is that?

President Morris: *Hicoria villosa*, that you find from Carolina southward.

Mr. Littlepage: You spoke of the Stuart as being the most hardy pecan in the latitude of New York. I presume you meant of the southern pecans?

President Morris: It seems to be one of the hardiest anyway. Even Virginia forms don't stand it through the winter as well as the Stuart. Mine are not fruiting as yet.

Mr. Littlepage: What varieties have you there?

President Morris: Appomattox and Mantura are northern ones I have.

Mr. Littlepage: Have you none of the Indiana varieties?

President Morris: Yes, I have the Indiana varieties on northern stocks, but those have only gone through one winter. They went through all right. I would say that the Stuart is quite as hardy as those.

Mr. Littlepage: I have observed the Stuart in Indiana. A friend of mine has a small orchard of several varieties of pecans. I notice some places where the Stuart has lived six or seven years, and then some particularly hard freeze has frozen it back. I have a letter from Mr. Jones in Pennsylvania, in which he says they had a recent freeze, and every variety of pecan he had there had suffered, except the Stuart. I don't recall whether he mentioned the Moneymaker in a previous letter or not, but he did mention the Russell and some other varieties.

President Morris: We have a number of pecan trees about New York that have been grown on private estates. Pecans have been planted in Connecticut and Massachusetts. You run across seedling trees here and there, and a good many of them are perfectly hardy. They are very apt to be infertile. The staminate flowers are apt to be destroyed because they mature so late, and they may not carry any nuts. Pollination is imperfect as a rule, and nuts may not fill.

Mr. Reed (Washington, D. C.): But trees of Stuart are in bearing?

President Morris: I don't know about bearing. Three years they have stood a temperature of twenty below zero, so that is a pretty good test.

Mr. Reed: You haven't seen any nuts yet?

President Morris: No, I haven't seen any nuts; but they mature their wood, and if they mature their wood, they are likely to mature staminate and pistillate flowers.

Mr. Littlepage: While it is true they may mature staminate and pistillate blossoms, the question arises whether or not the growing season is going to be long enough at the end to mature the nuts. I notice in going through wild groves in Indiana, once in a while you have a tree which never matures any nuts, though it has bountiful crops. The frost gets them.

Professor Craig: There is evidently a lack of summer heat to ripen fruit. Before we get quite away from this subject, I would like to ask Mr. Roper if he has noticed any striking differences in the hardiness of Stuart and other northern forms of the pecan in his particular locality. Does Stuart maintain its reputation for hardiness in his locality? We are interested in that question from the northern standpoint.

Mr. Roper (Virginia): I think it does, but that is discussed in a paper which I shall read some time here in the meeting. Both the Stuart and Moneymaker have done better with us than any other of the southern varieties when they are budded on hardy stocks. The grafted trees do not do well with us.

President Morris: Professor Lake, will you speak on any of these points?

Professor Lake: I am learning much and prefer to continue a learner. I shouldn't know anything about this crossing, except in the case of the *Juglans regia* and the oaks of California. That is one case that was not mentioned. We have a remarkable hybrid between the native oaks and the Persian walnut. It is remarkable in many ways. It has foliage that is perhaps half way between the oak and the walnut, and the nut on the surface looks like a small walnut, and on the inside it is between a walnut and an acorn. I had an opportunity to sample the flesh, but it is not edible yet. They are interested in the work very much, especially at Chico and the Southern California Station.

President Morris: It is said to be a cross between the live oak and the walnut. It seems absolutely impossible, but I have seen the nuts, and a photograph of the tree.

Mr. Reed: We haven't devoted a great deal of attention to the hybridization of nuts in our Department work. There is one thing that occurred to me, as I sat here, merely of passing interest. A gentleman in Mississippi sent a specimen of foliage, together with berries, from what he said was a hybrid between the pecan and the China berry; and he had the evidence, because the parent pecan tree stood right there, and the China berry was the other parent tree! He wanted world wide attention called to that. They were taken to the botanist, and he recognized them as one of the ordinary soap berries. There was a similar case this fall. A gentleman in Texas exhibited some nuts at the State Fair at Dallas that he said were a hybrid between the mocker-nut, the common hickory there in Texas, and the pecan. He said that the parent trees stood near one another and that the pecan blossomed some years about the same time that the hickory did, and in those years the hickory nut was long, and in other years it was short. Somebody sent one of the nuts to Mr. Taylor, Assistant Chief of the Bureau of Plant Industry. He sent the nut on to me, and I looked it up. I struck Texas on one of those cold wave days, and drove five miles out and back in a Texas livery rig, and found an ordinary hickory that bore nuts just a little different from others. That is one way the Department is called upon to ferret these things out.

Mr. Littlepage: I would like to ask Mr. Reed what information he has as to the success of pecans bearing when grafted or budded on other varieties of hickory? I say that because I know from traveling around through the country that there is a widespread impression that it is possible to have very extensive pecan orchards throughout the North by topworking the wild hickory. I have had some little experience along that line, but I don't know what the facts are; and Mr. Reed has made an extensive trip recently for the Department of Agriculture, collecting data in reference to the pecan.

Mr. Reed: The present situation, so far as we have been able to gather the information, is just this. The pecan has been grafted on a good many species of hickory, all the way from Virginia south to Florida, and west to Texas; but rarely ever can we find an instance in which they have produced satisfactorily after they have come to a bearing stage. We find that they unite readily ordinarily, and grow rapidly; but the pecan eventually proves to be a more rapid grower than the hickory, and when it catches up and is the same diameter, then the pecan growth is slower, and while they bear a little the first few years, later on they are not productive. I don't wish to say that is final, but it has been the experience so far. You will find most enthusiastic advocates of pecan on hickory where it hasn't been tried for any length of time. The men who try it find it unites readily and makes this quick growth, and think the question is solved. But aside from a few instances in Texas, I don't find very encouraging reports. It may be due largely to the fact that the right varieties of pecan haven't been used. We know that in the early history of pecan culture the Rome and Centennial and some others that are light bearers were used; and then the pecan on hickory has been looked at as so much saved, and they haven't been given much attention. It is still very much a matter of doubt, but is not in a very favorable light at present.

Professor Craig: I would like to ask Mr. Reed if he has looked over Mr. Ramsey's work recently at Austin, Texas.

Mr. Reed: I was at Mr. Ramsey's last year, and I don't recall that that matter came up at all.

Professor Craig: Didn't you see his plantation of topworked hickories?

Mr. Reed: I didn't know he had topworked hickories. He has topworked pecans. Professor Kyle of the Station in Texas has recently issued a bulletin on that very thing, and he cites a number of cases in which he concludes that there will be a favorable outcome; but for some reason, in the instances which he cites, the trees haven't borne very much. They attribute it this season in one instance to the fact that they had a storm at pollinating time, and last year some other accident happened that prevented them from maturing after a quantity of nuts had set.

Mr. Littlepage: I mention this at this time because I want to get Mr. Reed's testimony in the record, because I think that every prospective nut grower must go through this stage. A year ago I undertook on my farm in Indiana to bud the pecan into other varieties of hickory—I have a great many wild hickories growing all over my farm,—shagbark, shellbark, and different varieties of those even. So I went to work and budded perhaps one hundred of those trees, and for a while

it seemed that there was going to be a great degree of success. I budded them all upon the limbs where the bark was thinner, and tied the bud in with waxed cloth very tightly; and by absorption the majority of the buds lived a week or ten days. After that, there was perhaps a third of them alive. For the next two weeks, we could find an occasional bud that remained green, and then the number became so very small that I gave up the idea that any would live. But this spring I found a few of these had started to grow, but I had tied them so very tightly that in some instances where there had been a growth of an inch or two, the bud part had been cut in two. Then I undertook it on a much smaller scale. I cut back eight or ten small hickory trees three to four inches in diameter, let them throw up water sprouts, and budded into these. The bud wood I used stuck very tight, and I examined the buds in November, and there were quite a number alive of the Greenriver and Huntington varieties of pecan. Whether they will grow finally remains to be seen.

(A discussion then occurred as to holding the afternoon session and it was decided to continue the business during the afternoon, instead of visiting the Campus.)

President Morris: I would like to comment on one point made by Mr. Littlepage. He has given us perhaps the reason why pecans die back when grafted upon other stocks. Mr. Reed, that is an extremely important point. He has shown that the pecan grows so much more rapidly than other hickories that when it has arrived at a proportion to be supported by the root of the other hickory, it then ceases bearing because all the energy is required for maintaining this new pecan top that tries to grow faster than the hickory, if that is my understanding of this point.

May we not graft freely back and forth hickories of kinds which have about the same rate of growth, and may we not graft other kinds of hickories upon pecan stock, for we don't care how much nourishment is given to a fine young shagbark?

Mr. Littlepage: That is a fine point.

President Morris: I am very glad Mr. Reed brought up that point. It is going to save thousands of dollars if it is a fact recognized in time, because many would go to putting pecans upon other hickories. We may learn that certain kinds of hickories can be grafted to advantage upon other stock, however.

Mr. Reed: There is another point right there I would like to have your views on, and that is, the smaller the hickory is at the time the pecan is grafted on it, the greater will be the influence of the pecan on the hickory.

President Morris: It can drag the stock along perhaps. It has been proved, I think, that a graft has a certain influence upon the stock, and in some cases can drag it along willy nilly to a certain extent. The root and the top get to balance each other fairly well if the root is very small at the time the graft is put on. Most of the trees that have been topworked to pecan have been various kinds of large hickories. Perhaps if you were to take a shagbark hickory one to two years of age and graft it, the pecan top would dominate or control that root, no matter whether it wanted to grow or not.

Mr. Reed: The claim is sometimes made that if the pecan is grafted on other hickory young enough, it will transform the hickory completely. It will make a sufficient root system to feed the pecan as well as the pecan root would. But I have never seen that demonstrated.

President Morris: That is speculative. It is a very valuable point, one of the sort of points that would naturally be brought out at a meeting of this kind.

Mr. Reed: Have you seen that with other fruits, Professor Craig?

Professor Craig: Yes. Each variety of apple produces its own kind of roots without reference to the seedling stock. That is to say the scion overrules the root in budding or grafting upon one or two year old seedlings.

President Morris: A parallel that comes to mind now is the grafting of Burbank's Royal walnut upon ordinary walnut stock. When that was done, his Royal walnut was said to drag the other walnut along.

Professor Craig: I think it is a very valuable suggestion. I am not sure I will go as far as the President has gone; but I think it is exceedingly suggestive, and worthy of careful consideration.

Mr. Rush (Pennsylvania): I find the same experience in some instances, that the graft outgrows the stocks. That is a peculiar instance of the work of improper unions. Eventually the stock pushes up and forms a perfect union in growth, with the Persian walnut. This is particularly applicable to pecan and hickory. I suppose Mr. Reed will bear me out in that, with regard to English walnut and black walnut.

Mr. Reed: Oh, yes.

President Morris: You occasionally see a variety of apple grafted on another in which the graft part gives the tree a sort of slipshod appearance. How about the bearing in that kind of a tree?

Professor Craig: They usually bear heavily where the food supply is restricted.

Mr. Reed: That would make our pecans bear more heavily on hickory stock than on their own.

Professor Craig: As a matter of theory, they ought to. The bear-

ing ought to be increased, because it is a system of girdling, or brings about the same effect,—in other words it restricts the return flow of the elaborated food. The food is checked at the point of union. Another parallel is in the case of *Prunus domestica*, the European plum, when worked on *Prunus Americana*, the American plum. In that case, the top always outgrows the stock, and in ten years it presents a very curious appearance. It presents the appearance of a very top-heavy head on a very spindling stem. The bearing is usually encouraged, but the fruit is usually small. The amount of fruit measured by numbers is increased, but the amount of fruit measured by the size of individual specimens is decreased.

Mr. Collins: Isn't the size of the fruit increased in the case of apples?

Professor Craig: By topworking, usually, it is, but that doesn't contemplate such an extreme case as that. It means when the union is reasonably uniform, when there is a reasonable affinity between stock and scion. But in extreme cases we get the opposite result. Reproduction is encouraged, but size of fruit is checked.

President Morris: I would like to hear from Mr. Rush or Mr. Pomeroy in connection with the hickory.

Mr. Pomeroy: I haven't ever tried any experiments with the hickory.

President Morris: We will discuss further some of the points that have been suggested in this paper, because it seems to me we are along a good line of cleavage, and this line of cleavage may dispose of some questions that we haven't discussed. One question brought up was if the bitter, astringent qualities are likely to be recessive among hybrids in the trees which have bitter nuts.

Mr. Littlepage: I made a trip through Missouri and Arkansas a year ago, and while there, took occasion to go into the forests, and investigate to some extent the Arkansas and Missouri hickory and pecan. Among other things, I found two hybrids, one of the pecan and one of the pignut, one of which was bitter and inedible, the other a fairly good nut. I have both of them with me here today. One of them was very astringent and bitter, the other had taken more the quality of the pecan as to meat, and was a fairly good substitute. I don't know what the reason for it is, that one is fit to eat, and the other isn't, when they are both hybrids between the pignut and the pecan.

Doctor Deming: How did you know they were hybrids, by the appearance?

Mr. Littlepage: Yes, the appearance is unmistakable. The pignut characteristics are very prominent, also the pecan characteristics.

President Morris: Have the members anything to say about the Stringfellow method of transplanting hickories?

Doctor Deming: I have had very little experience in transplanting hickories, but I set out two Hales hickories I got from Meehan, and they are both living, although they have made little growth in some three years. Can you tell us what stocks the Hales hickory is grafted upon?

Mr. Brown (Pennsylvania): Upon the bitternut. All there are have been upon the bitternut from the start.

Doctor Deming: Mr. Littlepage, what do you think of the future of topworking our seedling hickories in the North with improved varieties of hickory or pecan,—the commercial future?

Mr. Littlepage: It is largely speculative. I suppose it is the province of every nut enthusiast to have an opinion about these things. In fact, I find it is encouraging to talk to the fellow who has an opinion. My notion is that there is a great future for topworking the various varieties of the hickory in the North to the desirable forms of the hickory, that is, of the hickory other than the *Hicoria pecan*. On my farm I expect next year to devote some time to topworking the various hickories I have to the desirable varieties of the shagbark. I think that can be done throughout the whole country. The shagbark seems to be indigenous to such extensive latitudes, that it seems to me there are great possibilities along that line. I observe that around here we find many of those trees. I have some very beautiful shagbarks that came from Canada. My opinion is that it will be successful. I think the reason the pecan has not proved very satisfactory upon the other species of hickory is that most of those hickories have a close grained wood, and that the distribution of available food depends largely upon the amount of sap. The *Hicoria pecan* is a much coarser grained wood. The flow of the sap upward is facilitated much more than the flow of the sap upward through the hickory stock of other varieties. I believe that is the reason the theoretical rule would probably not work in this case, simply because the distribution of sap cannot take place fast enough through the tight, close grained stock of other varieties of hickory. Otherwise, I don't see why the rule would not obtain, as with fruits. The experiences Mr. Reed gives, I think, are generally recognized by those who have experimented with them to any extent. I noticed in visiting Mr. Roper's nursery he had one very beautiful specimen of the pecan grafted on a hickory. That was the Stuart, was it not?

Mr. Roper: The Moneymaker. It had made a growth of four or five feet in two years.

Mr. Littlepage: Do you know the variety of hickory that it was topworked to?

Mr. Roper: Just our common hickory, I suppose the pignut.

Mr. Littlepage: It made beautiful growth from the wood standpoint.

Mr. Roper: Mr. Reed's point was that it would do that till it got by the period of good nutrition from the root. Professor Craig says the elaboration of food from the pecan top more than overcomes the deficiency.

Professor Lake: I would like to question Mr. Littlepage's physiological ground for the lack of proper fusion of liquids between the pecan and the other hickories. I believe it is not authenticated that the water supplies from the earth would not distil as fast in the close grained hickories as in the more open grained pecan. At least, the very close grained, firm woods of the tropics transmit a tremendous amount of water, much in excess of many of our fine grained woods of the North. And it seems to me I wouldn't like to have this Association go on record as vouching for this explanation exactly. It seems to me there are better explanations. Lack of fusion is not due to the amount of water that is carried up, but rather to the fact that the root system of the hickory does not develop fast enough to collect water to transmit.

Mr. Littlepage: I am very glad to hear Professor Lake's statements. My suggestions were given only as a possible theory that occurred to me, and I don't vouch for their accuracy. There must be some explanation to controvert the general rule which Professor Craig has given us.

Professor Craig: May I add one word? When a stock and scion unite, the union is really a mechanical one. It is a union of cells, and in that respect it is simply mechanical, not a physiological union. The different life types or character of the scion and top do not fuse, but we have a mechanical union of cells, and that mechanical union is as clearly shown forth as possible when we make a section through the point of union. If your type of cell in the stock differs very materially from the type of structure in the scion, the union is unsatisfactory. If the types of tissue are much alike, the union is good and you do not have either overgrowth of stock or undergrowth of scion very much, but you have what is called a good union. It is to some extent a question of mechanics, in my judgment, influenced by the cell structure of stock and scion. If you have a good, smooth union, the two grow equally. Where you have overgrowth of scion, you usually have a starved root, because the food which is to be returned elaborated is checked at the point of union, the root is starved, and you have a short lived tree, because your root system, which ought to receive its share of the distributed food, is underfed, finally weakens, and the whole structure fails.

Professor Lake: You may have mechanical union, but you can't

have the after fusion in which you are going to have proper function of stock and scion.

Professor Craig: Each cell functions after its own kind. It is a question of passage or transmission of food through that carrier, after the union is effected. If the character of the two types differs very much, the transmission of food is checked and is difficult.

President Morris: There is another mechanical point I'd like to ask about. When the two types of cells differ, will the difference in degree of capillarity regulate the amount of pabulum distributed, or does it depend upon negative and positive pressure?

Professor Craig: That is a very difficult question, because it isn't settled at the present time what credit we should give to capillarity and what to root pressure in sap circulation.

Mr. Reed: There is another question I would like to ask Professor Craig. Supposing you have a mechanical union perfected, what is the difference in the food that different species of the same genus transmit? Has that been worked out?

Professor Craig: I don't think so. Of course, there is a difference in the food. That is proven, because there is a difference in the quality of the food. The tree machine, the tree factory speaking individually, evidently makes different products, and that is shown by the different quality of nuts. That is all we know about it.

Professor Lake: That part below the scion still continues to be normal hickory, and that part above, pecan, so really it is not a matter of distribution of water supply by gravity or other pressure, but rather a distribution of the proper amount of elaborated food; and that is transmitted through the cell itself, not the cell walls. Because this top makes a food that is different from the normal requirements, or because the latent character of those cells below does not respond to the food supply as actively as the part above, is the whole question, it seems to me. If the cells below functioned as the cells above, there would be no question about the stock and scion being the same.

Mr. Littlepage: Of course there must be sufficient flow of sap to distribute food. The hickory root might not send the flow of sap as fast as the pecan top would like.

Mr. Reed: Is Mr. Lake's point always true, that the stock below the point of union remains a normal hickory?

Professor Craig: I don't believe there are more than one or two exceptions noted to that, and those exceptions are recorded under graft hybrids.

Mr. Reed: A seedling pecan tree owned by Mr. B. M. Young of Morgan City, Louisiana, was top worked with scions from the McAllister hican some seven or eight feet above ground, and later on the bark

of the pecan trunk below the point of union became scaly like that of the hican above.

Professor Lake: That would suggest something worth while, if that part below would produce fruit like the part above, but I would want to question a little the modification in bark characteristics being a direct result of cross grafting.

Mr. Reed: Of course, it was no check—only one instance.

Professor Craig: There are one or two others that are authentic. I have known a case of plum. Here we have the plum stock, we will say it is *Prunus Americana*, grafted with *Prunus triflora*, the Japanese, then later on, *Prunus domestica* is put on top. I have seen a sprout from triflora bearing Japanese plums, while the top of the tree bore *Prunus domestica*, although there was only a small section of stem in there between our two distinct species. They were perfectly normal.

President Morris: Each elaborates its own kind of food in its own kind of cell. I would like to hear from Mr. Brown and Mr. Wilcox on this matter of grafting—the influence of stock on scion.

Mr. Wilcox: We had a good show of stocks, but instead of allowing them to become established in the pots, we grafted them as they started into growth after rooting. Had they been established, we would have expected better results.

Professor Craig: What method do you employ?

Mr. Wilcox: Side grafting.

Professor Craig: Do you mean whip grafting?

Mr. Wilcox: Side whip grafting.

Doctor Deming: I would like to ask Doctor Morris what he thinks of the practical future of grafting our hickory seedlings with improved varieties of hickory or pecan, and the method most likely to succeed,—whether grafting or budding, and at what season. It is important to learn whether we can so graft or bud our hickory sprouts that within a few years we can hope to get something from them.

President Morris: We can only make a parallel with the pecan. If we know that it requires fifteen or twenty years for coming into bearing as a seedling tree, and if we know that it bears frequently in two, three, or four years after being grafted we can anticipate analogous action with other species of hickories. I haven't been able to get testimony from men who have grafted hickories. One man told me he thought shagbark grafted upon other shagbark, topworked, came into bearing in seven or eight years. Another man told me that his came into bearing in a much shorter time than it would otherwise, while with one particular variety, the Hale, I think that twelve years has been required for the tree to come into bearing.

Doctor Deming: I have a communication from Mr. Hales in which

he speaks of a tree grafted in 1880, but doesn't say when it began to bear.

Mr. Littlepage: He told me it has taken some of them twenty years.

Doctor Deming: But the pecan on hickory has been known to bear the second season, that is, topworked. Can we expect such results in topworking our own hickories?

Mr. Littlepage: I think so.

Doctor Deming: Are we going to have success in topworking, and by what method?

President Morris: I believe in the South they can graft, but in the North we have got to do it by budding. My best results have been late July or early August. I believe herbaceous budding promises a good deal.

Mr. Rush: Were those buds then of the year previous?

President Morris: Those were buds from the year of the scion, and herbaceous stock of the year.

Doctor Deming: Mr. Littlepage has had some success in budding hickory very early, haven't you?

Mr. Littlepage: I was just stating that I started in last year to bud. I think it would be possible to make a pecan orchard bear early by budding into these hickories, ten, fifteen, or twenty years old. This next year I am going to try hickory on hickory. I am going to try three processes. I am going to try bark grafting, and whip grafting in the body of the tree which has been cut off. Then, I have quite a number of hickories each four or five inches in diameter that I have sawed off and allowed to put up clusters of water sprouts, and I am going to whip graft some and put paper sacks over them, and see which is the best.

President Morris: I have found budding the best.

Mr. Reed: Doctor Morris referred to the analogy of the pecan grafted on pecan as coming into bearing in two years. Do you account for that in the fact of its being a graft, or the fact that the wood you selected came from a tree that had the characteristic of early bearing?

President Morris: No doubt that characteristic was transmitted, and further, no doubt the grafted stock was used from bearing wood. Those points are all of interest.

Mr. Reed: Does the mere operation of grafting or budding influence earliness of bearing?

President Morris: Yes, if I understand the question rightly. A tree that might not bear for fifteen years as a seedling may bear in three years grafted.

Mr. Rush: I have Persian walnuts that bore two fine nuts the second year. I have young trees, one about thirty inches, and I am

sure it will be full of nuts next year, unless some providential misfortune should intervene.

Mr. Reed: At what age did the original trees begin to bear?

Mr. Rush: Those were buds shipped to me from California.

Mr. Littlepage: I am firmly convinced that there is something in the process of budding or grafting that stimulates the growth. For example, I have scions that were not over four to eight inches long grafted on one year seedling pecans which, at the end of this season's growth, were as much as thirty inches high. All along in the same row where seedling pecans were not grafted, there is none over eighteen inches high.

Mr. Reed: To have made exact comparison, you would have had to take buds from your seedling nursery trees, and graft on other trees. You are comparing these buds from one tree with seedlings of another.

Professor Lake: I would like to ask if you didn't bud or graft the best stocks in the row too?

Mr. Littlepage: We took the whole row, as we came to it, but that particular tree might have been on some particularly favorable stock. It is a matter of a good deal of interest to see why a seedling which wasn't budded at all didn't grow as high as a scion which was budded in summer, stratified all winter, then put into the ground in an unnatural position.

Professor Craig: It is the same principle, I think, which we discover in pruning. If we prune heavily during the dormant season, the effect is increased vegetative growth. If we wish to stimulate the growth of an old tree somewhat debilitated, we go to work and cut off a large portion of the top. We don't disturb the root. The effect is that with the same amount of pushing power from the root, we have a decreased area over which that energy is spread, and it results in apparently increased growth. I am not quite sure if we were to measure it up in a scientific way, we would actually find it was increased growth. There are fewer branches, but they have made greater length. In the case of grafting our pecans, we cut off our tops, set a two-bud scion in the root, and usually but one starts and receives all the vigor from the established root, instead of the vigor being distributed over several buds on the original seedling top. We have as a result of that concentration of vitality increased growth. I think that theoretical explanation will stand fairly well, because it seems to be directly in line with the effect of winter pruning.

Mr. Reed: I would like to ask Professor Craig to what extent he would select seed for nursery purposes? What influence would the characters of the parent tree from which the seed came have on the grafted tree?

Professor Craig: I don't believe that we can expect the characters of our stock to affect the scion to any extent. I think what the nurserymen should have in mind and keep in mind is a good, vigorous stock, and as many stocks as possible,—as he can get out of a pound of nuts. Otherwise, I don't think it cuts much figure. In that connection there is a principle which I have discovered by experience, namely, that if you are growing stocks it is wise to get your nuts as near your own locality as possible. My experience last year in planting five hundred pounds of northern grown nuts in a southern locality, and five hundred pounds of southern grown nuts in the same locality, gathered in that locality, is that I got fifty per cent more trees from my southern grown nuts than northern, and trees that were fully thirty per cent better.

Mr. Littlepage: Where were your northern grown nuts stratified?

Professor Craig: They were not stratified. They were planted as soon as they were received, and they were received within two weeks from the time they were taken from the trees.

Mr. Littlepage: I am inclined to believe that if your northern grown nuts had been stratified in the North, and undergone the customary freezing and thawing, then had been taken up in the spring, you wouldn't have seen that difference.

Professor Craig: I think that point is well taken.

President Morris: There is no doubt about that. In that same connection—I would choose nuts for seed purposes of a mean type, for the reason that nature is all the while establishing a mean. The big pecan is a freak. If you plant big or small nuts, you don't get big or small nuts in return. You get both big and little seeking a mean.

Mr. Roper: The large nut will give a better tree. We have tested that out.

President Morris: Does that work out logically in that way, is it a comparative matter all the time?

Mr. Roper: We haven't worked that out in the bearing, but in the nuts in the row, the small nuts did not produce as large trees as the large nuts. We never tested the mean nuts. We did select some of the very smallest we had, and planted one of the northern and one of the southern type. They came up, but the trees amounted to nothing.

President Morris: The idea I meant to convey was that both very small and very large nuts are freaks, and neither likely to give as good a tree as mean types. What would you anticipate, Professor Craig?

Professor Craig: I think that would resolve itself on a practical basis from the practical standpoint. I think the mean or average sized nut would give you the best results. There is no doubt, as Mr. Roper said, the very small nut would give you weak seedlings. On the other hand, you couldn't afford to use the very largest, so that a mean be-

tween large and small would be the natural thing to choose. But we should do nothing to discourage the planting of the finest specimens, with the possibility of getting something unusually good. That is certainly the work for every amateur.

Professor Lake: Does that statement, that you think it doesn't make much difference about the parent of the nuts for stock, apply to walnuts?

Professor Craig: I haven't had any experience in walnuts.

Mr. Littlepage: I would like to ask Mr. Roper if he knows of any examples where selection of fine varieties of seed has not resulted in getting a more productive variety of the plant which he was producing?

Mr. Roper: Only one, and that wasn't in a tree.

President Morris: In regard to coming true to type, I think records have been made of many thousands of pecans, and I don't know of any instance where the progeny resembled the parent closely.

Mr. Pomeroy: Maybe someone could explain one of my failures a few years ago in planting some Persian walnuts. I went to another tree in western New York, and got a peck or more. They were planted the same day, in the same ground, and all came up. Those I got from another tree resembled a hill of beans, and stayed that way for three years. Why wouldn't those grow? In soil three feet from those, there were trees growing. Those nuts never did make trees. The nuts were of good size.

Colonel Van Duzee: As a practical nurseryman, I wouldn't think of planting nuts from a tree that I didn't know individually. We have had very much better success with nursery stock where we have chosen as seed medium sized nuts from vigorous trees with which we were acquainted. In the case of Mr. Pomeroy, I don't think there is any question but that the history of his tree would account for the failure. In other words, his nursery stock was undoubtedly from the results of years of slow growth on the part of the original tree, or unfavorable conditions of some kind. I don't quite agree with Professor Craig on the question of the influence of stock, because I believe it is really a very important point.

President Morris: We are not here to agree upon anything.

Colonel Van Duzee: I can't speak from the scientific standpoint, but I am quite sure that in the nursery business I shouldn't care to overlook that influence.

President Morris: When men agree, it means we are on stale old ground which has been thrashed over.

THURSDAY AFTERNOON, DECEMBER 14, 1911.

President Morris: The meeting is called to order. The first paper this afternoon will be that by Mr. J. Franklin Collins of the United States Department of Agriculture, on the chestnut bark disease.

THE CHESTNUT BARK DISEASE.

J. Franklin Collins, Washington, D. C.

I presume some of you know as much about certain features of this chestnut disease as I do myself; for I have only worked over certain sides of the whole question. I also presume that you are all acquainted with the fact that this disease, which is known as chestnut blight or the chestnut bark disease, is without doubt the most serious disease of any forest tree which we have had in this country at any time, that is, so far as its inroads at present appear to suggest.

I want to call your attention to certain general historical facts in connection with the disease, facts which are familiar to some of you, but unfamiliar possibly to others. The Forester of the Bronx Zoological Park, Dr. Merkel, discovered in the fall of 1904, or had his attention particularly called in 1904 to the fact, that a good many chestnut trees were dying in his vicinity, a number sufficient to have attracted especial attention. He looked at the matter carefully, and decided that there was a definite disease on these trees. He handed specimens over to Doctor Murrill of the New York Botanical Garden; who worked out the disease, and decided that it was a new fungus which was causing the trouble. He named it *Diaporthe parasitica,* the name under which it is generally known today, although there is some question as to whether that is the one which should be applied to it. This, you remember, was in 1904—in the fall.

The first publication which appeared on the disease was in 1906, as I recall it. The publication which then appeared was Doctor Murrill's upon his investigations. The disease has spread very rapidly since then, so that today we know the disease in a general area indicated by the red color on this map. The green area indicates in a general way the natural distribution of the common chestnut. Since 1904 investigations upon the geographical range of the disease have been carried on so far as to show that the disease is now known over approximately the area indicated in red on that map. The northern limits of the disease are perhaps in New York State. Further east, it is known as far north as northern Massachusetts, mainly in the western part, and it is also known in Boston. There have been two or three

cases of the disease found in the Arnold Arboretum. On the west, we have two cases in West Virginia, and the most southern station which I know of is in Bedford County, Virginia. But those are isolated stations beyond the area which is indicated here. I shall have a little more to say in regard to the distribution.

Before speaking of that, I want to call your attention to a few points in regard to fungi in general, points of common knowledge to all who have studied fungi or mycology. A fungus is a kind of plant which does not, on account of the absence of the green coloring matter, manufacture its own food. It is a plant which has, in other words, no green foliage, and as it has no green foliage, it must obtain its organic or elaborated food from some other source. The fungi have very aptly been termed the tramps of the vegetable kingdom, that is, they live on food prepared by somebody else. They can take certain organic substances and change them apparently into other organic matter which can be used by the plant. In the case of this chestnut fungus, we have a fairly typical fungus in certain respects. We have a vegetative stage of the fungus which is nothing more or less than a lot of threadlike structures penetrating the bark of the chestnut, the inner bark or the middle bark, and there drawing the organic matter from the bark of the chestnut and appropriating it to its own use. Fungi, like practically all other plants, have two stages of existence, one the vegetative or growing stage, the other the reproductive stage. Sooner or later the fungus will produce the fruiting bodies, after it has obtained a sufficient amount of food to justify the formation of these more highly organized structures. In the case of the fruiting body of the chestnut fungus, we have very small, pinhead-like structures, which come out to the surface of the bark, the vegetative portion developing through the interior of the bark. On smooth bark we find that these fruiting pustules are apt to appear all over the surface. With bark that is sufficiently old to have ridges and crevices, we find these fruiting bodies only in the crevices.

These fruiting pustules which you will see on this bark are the structures which produce the reproductive bodies, these latter being known as the spores. There are two types of spores which are produced by this fungus. One is the type which is commonly spoken of as the summer spore, the other the type which is spoken of as the winter spore. The winter spore is known from the point of view of the mycologist as the perfect stage of the fungus, that is, it is the more characteristic of this particular fungus. If we should make a cross section of the bark, we should find that the vegetative stage is running through the middle bark, and commonly the inner bark, sometimes in one place only, sometimes in the other only, sometimes in both. This

vegetative stage later sends up in various ways a mass of tissue which results in the formation of pustules. These appear on the surface, sometimes more or less regularly rounded, sometimes rather irregular. In the case of the summer spore stage, we have inside the pustules a mass of tissue which is formed into spores. The interior of the spore mass, or at least portions of it, is somewhat mucilaginous, so that when moisture is applied a swelling of the interior mass is produced at a certain stage and something has to break. As a result, we have a mucilaginous mass pressed out through the break in the shape of a twisted thread, much the same as if you take a collapsible tube of paste and pinch it.

Now, one of those summer spore threads may contain anywhere from one to five million spores. I have tried to estimate the number in a thread of this sort which was about an eighth of an inch long, and by taking a certain portion of that thread, mounting it in a drop of water, and then counting over a certain measured area under the microscope, I have estimated, by multiplying, that there were 2,400,000 spores in that one thread. So you can imagine how many of these spores may be produced by a single diseased area which has produced perhaps four or five hundred of those pustules, each pustule containing anywhere from one to twenty threads. Each one of those spores may develop a new diseased area, provided it is transported to a fresh break in the bark of a chestnut tree. Fortunately, only a very small fraction of one per cent ever reaches the proper place for growth.

This last is what I alluded to as the summer spore stage. There is a winter spore stage, or technically, the ascospore stage, which comes, as a rule, later in the development of the fungus. In this same pustule, later in the season, certain sacs are formed. These have long necks which extend to the top of the pustule. These sacs are sufficiently large to be seen with the naked eye. They are dark colored. Inside these, we have a lot of smaller transparent sacs or cases in each of which we get eight spores, sometimes in one row, sometimes in two rows. Each spore can propagate the fungus.

We have, then, two types of spores, either one of which can reproduce the fungus under suitable conditions. There is still another way by which the disease may be kept going. The vegetative stage can survive the winter and continue growing the following year.

I will say right here that I am planning to give you merely an outline of this disease, and have time afterwards for questions which I think in a meeting of this sort are one of the most productive sources of information.

In regard to the rapidity of spread of this disease, I will merely call your attention to two cases as illustrations, or to certain facts,

rather. One is that the disease, so far as our attention has been directed to it, has developed over the area indicated on the map since the fall of 1904. Another case is one which has occurred in Rhode Island, where I have had a chance to watch its development a little more closely than in other places, that is, more constantly. In the fall of 1908, after I had made over thirty excursions around Rhode Island, I was unable to find a single trace of this disease, and no one else was able to find a single case of the disease in Rhode Island. In May, 1909, I happened to be about five miles west of the city of Providence, and I found two or three cases, all in one rather restricted spot. Later, it was discovered a little farther south, and soon, a little to the north, so that at the end of the season of 1909 we knew of about ten cases in Rhode Island. At the end of 1910, a season in which very few trips were made with the special object of surveying for the disease, we had more than doubled the number of infections found. That led to putting someone into the field in 1910 to make a survey of Rhode Island. A man was also put into the state of Massachusetts for the same purpose. Mr. Rankin, in cooperation with the United States Department of Agriculture, made a survey of New York State, which has resulted in this map. A man was put into Pennsylvania and one into Maryland for the same purpose. As a result of the survey in Rhode Island, where at the end of 1910 we knew of less than fifty cases at the outside, we now know of very nearly 4000 cases. It has been much the same story in Massachusetts. At the beginning of this year, there were four towns in which the disease was known; now there are seventy-one. At present in Connecticut, the disease is known in one hundred thirty-two towns of the one hundred sixty-eight in the state, and the southwestern part of Connecticut is very badly infected, just as badly as the adjoining portions of New York.*

So much for illustrations of the rapidity with which the disease develops. I am not going to say at this time anything special about the origin of the disease, simply because we haven't yet decided what was the probable origin. I will merely say there are some different theories in regard to the origin. One is that it was imported from the Orient, another, that it is a saprophyte, a fungus which has lived normally upon dead organic matter, but which has taken on the parasitic form, which develops on living organisms.

In connection with any disease of this sort, one naturally inquires, how are we going to recognize this disease? This past summer Pennsylvania has put into the field thirty or more men who have been trained to recognize this disease, with the idea of locating the infections

* Since this statement was made the disease has been definitely reported in approximately 164 towns in Conn. [J. F. C.]

in Pennsylvania. As perhaps all of you know, the legislature of Pennsylvania has passed a law relating to this particular disease, and has appropriated $275,000 to see if the disease can be controlled. Their idea is that they have perhaps fifty million dollars' worth of chestnuts, and if $275,000 can show whether or not this disease can be controlled, it is economy to try it.

So far as Pennsylvania is concerned, it means possibly the saving of the chestnuts in the middle and western parts of the state; but it also means that if they can check it there, it is likely to save the great area of chestnut growth along the southern Appalachians. I don't want to make any prophecy as to how that experiment is likely to come out, but, however it comes out, it will be a very great object lesson as to what can be done on a large scale with a disease of this sort.

One of the first things which had to be considered in Pennsylvania was to train a number of men to recognize the disease, so as to go over the country and locate the diseased spots. The method of recognizing the disease I will briefly outline. Of course, over a large country, many hundreds of square miles, it is a long, and laborious operation to look over every tree. It is perhaps impossible without a very much larger force than $275,000 could put into the field. But there are certain clues to the location of the disease which can be seen a long distance, a quarter of a mile, at any rate. The means of recognition is by what I commonly call danger signals. This fungus, when growing through the bark, starts from the common point of infection and grows in all directions, up the stem, down the stem, and around the stem. Wherever this vegetative stage, technically known as mycelium, penetrates, the bark is killed; and of course, you all know what that means. When this has succeeded in reaching around a twig, branch, or trunk, everything beyond that girdled area dies, not immediately, perhaps, but sooner or later it dies; and it dies in such a way that the leaves change color during the summer. The first obvious change which can be noted is a slight wilting of the leaf; then the leaf assumes a pale green color, and from the pale green it takes on a yellow stage; from this a reddish yellow stage, and then a brown, till the leaf is the ordinary dark dull brown of the dead leaves. This coloration which takes place is conspicuous. There is your guide, your danger signal. If the disease has worked very long, half a season, in one locality, you are almost sure of getting some of these danger signals. Where one is present, you can go and look up the cause of that danger signal. It may be a broken twig, but the point is to find out if it is this disease which has caused the danger signal. We start by looking at the danger signal, then at the base of the dead area. If we find here some of the reddish pustules which have been shown on this bark we are quite sure that the disease

is present. Then by cutting into the bark a little, instead of the normal buff or yellowish tint of the fresh clean bark, we get, when the disease is present, a rather mottled effect, varying from a brownish to lighter or even darker. There is a peculiar fan-like effect to this mycelium which penetrates the bark, so that by shaving off the surface of the bark, you get this mottled appearance, which gives you another means of identifying the disease. So we look for the danger signals, and then look for the meaning of the danger signals. If we find those two things, the pustules and the mottled mycelium, we can very safely say that this disease is present.

There are a few fungi which closely resemble this chestnut disease in general appearance, but they are not very common, and are not confused with the disease, as a rule, when you get the lens on them.

In regard to the experiments for the control of the disease, I want to say a few words. As far back as 1907, the United States Department of Agriculture began experiments on certain experimental plots, particularly in Long Island near the region where the earliest cases of this disease were known, to see if it could be controlled on individual trees after they had become infected. Later, experiments were undertaken along the same line in Lancaster County, Pennsylvania. Spraying was tried, although there was no idea that it would be of any use, because the vegetative stage of this fungus is running through the interior of the bark, where no spray could reach it. Thus spraying was found to be of no use whatever. Then the operation of cutting out the disease was tried. Where the diseased spot appeared, it was cut out with a gouge. Then the exposed area was covered in various ways with antisptics.

This gave, for a year or two, very promising results, but about the third year the disease appeared to get over on to the margin, where it had been cut. This led to the later discovery that the disease had been running in the wood, as we had previously suspected. So the cutting out of the bark alone is not sufficient. This year cutting has been done so as to include a portion of the sap wood.

There is just one other topic which I want to allude to. That is in regard to the immunity question. It has been found that this disease attacks the common native chestnut, the chinquapin, the various cultivated European chestnuts, but very rarely the Japanese. In regard to this point, I hope that Doctor Morris will tell us something about his experiments on the breeding of chestnuts with the idea of producing a new and immune variety.

You will understand that I have just made an outline of this disease, and I hope that, if there are any questions to be asked, you will make them easy, so that I can answer them.

President Morris: This very interesting paper is now open for discussion, and I hope that we can get some points which will allow us to know how to control the disease. With the wind-borne spores that are carried miles and miles by a single sharp gust of wind, this disease is a difficult matter to control. We must, I believe, find some natural enemies, if we can. I don't know where to look for these. I will have to ask the mycologists what we may anticipate along the line of natural enemies. I would like to ask if it is common for a weak species to become a devastating species. Have we many parallels in the field of mycology? The point relating to raising immune kinds is one for discussion. Are we to raise immune chestnuts? The history of most plants, I think, has been this, that where they have met their enemies in their natural environment, the fittest survive; and it seems to me that this is a case in which we perhaps have survival of the fittest in North Asia; for the North Asian chestnuts certainly resist the disease better than any others, but the chestnuts of southern Asia are quite vulnerable to it. In my own orchards, I have twenty-six kinds of chestnuts, and have followed them along, for the purpose of determining which ones would resist the blight best. I cut out last year 5000 old American chestnut trees on my property. There is not a tree in all that part of Connecticut, the vicinity of Stamford, that is not blighted, and very few that are not dead. Now, in the midst of this disaster, what was the behavior of my experimental chestnuts of various kinds? It was this. I had about one thousand Koreans that lived up to five years of age, growing in the midst of blighted chestnuts, and none of these blighted. It occurred to me that it might be well to graft these on the stumps of American chestnut, because these Koreans resisted the blight; but when I grafted them on the sprouts of American stumps, at least fifty per cent of the Koreans blighted, showing that the pabulum wanted by the *Diaporthe* seemed to be furnished by the American chestnut. I had some chestnuts from North Japan that resisted the blight, and yet these grafted on the sprouts from American chestnuts blighted. I had some Chinese chestnuts, and none of those have blighted as yet; and in grafting them, two or three have not been blighted. I have perhaps twenty-four chinquapins, both the western form and the eastern, and only one branch of one tree has blighted. Of the southern Japanese chestnuts, very many are blighted. They are not as resistant as the northern. I have a good many chestnuts of European descent, and among these some resist the blight pretty well; and some of the American progeny, like the Hannum and Ridgely, seem to resist well enough, so that now I am grafting these upon many different sprouts. This should be worked out, and I wish to know what men have tried experiments along this line. I would like to ask Professor Reddick to discuss this question.

Professor Reddick: I have very little that I can add at the present time. The points the talk has raised here are of the greatest importance, and there is certainly room for a great many people to work, though here in this state we have only one man who is devoting his attention particularly to this disease. I find in connection with the work that Professor Collins is doing, and in connection with the Pennsylvania work, that there are some people engaged on these very vital and important problems. They are not giving any particular attention to field work, but are working on these special problems. I think you all appreciate that progress of investigations on this kind of subjects is rather slow, and in the meantime the man who has his trees and his nurseries blighting is surely up against it.

I have only one thing in mind, a thing which I suggested to Mr. Rankin when he first started on this work, and it is a thing which Doctor Peck, our state botanist, suggested at the chestnut bark conference that was held in Albany not long since. Doctor Peck says that he has lived a good while, and he has seen epidemics come and go. Certain plants, certain varieties were threatened with extermination, yet at the present time they are still with us. I suggested to Mr. Rankin that, while it looked as if chestnut blight was going to be with us indefinitely, the chances were it would all be gone before he had a chance to find out all the things he thought he was going to. Our friend Doctor Clinton of Connecticut would have us think it is only a matter of a few years to have conditions come around so that the chestnut blight will not be a thing of serious importance. In other words, Doctor Clinton stoutly maintains that, while this fungus is doing so much now, it is largely due to the condition to which our trees have come, owing to a succession of very unfavorable summers and winters; and as soon as the conditions get around to normal, the disease will be no more. Some of us are not inclined to agree with him entirely.

Professor Craig: Perhaps you can tell us what Mr. Rankin has been doing this year.

Professor Reddick: At the beginning of the past summer, from the surveys and observations that had been made almost entirely by the United States Department of Agriculture authorities, it was known that the chestnut disease had extended up the Hudson River perhaps as far as Poughkeepsie. It was our idea that he would probably find the border line of healthy and diseased trees somewhere in the vicinity of Poughkeepsie, so Mr. Rankin located it opposite Poughkeepsie at Highlands. During the course of the summer, the assistance of the State Survey Commission and the State Department of Agriculture was enlisted, and there were six or eight men who spent part of July and all of August surveying the portion which now appears on this map

in red. The results of this survey show that the entire Hudson River Valley, with the exception of a small part in the vicinity of Albany, is now infected. In fact, it is the general opinion that there is no use whatever to attempt in any way to save the trees in this locality. Very fortunately there is a strip of territory which is almost solid spruce forest, and in which there are almost absolutely no chestnut trees. We have already, then, abandoned the Hudson River Valley, but with this great natural barrier, you see that it is going to be relatively easy, so far as the State of New York is concerned, to put some sort of an artificial barrier across the little neck there. This all depends on what can be done in Pennsylvania. This cross-hatching of red along the Delaware River represents an area in which the infection is only partial, and the few dots of red shown about Binghamton represent localities in which the blight has now been exterminated. The diseased trees have been taken out, stumps killed, and bark burned. We are in hopes the disease will not reappear there. I don't believe things have been definitely settled at Albany in the Department of Agriculture, where the control work naturally lies, but Commissioner Pearson is very anxious that something be done to try to control or prevent the further spread of the disease in our state. Plans are being made so that a large number of men will be located in this territory next summer, making very careful inspection, removing the occasional diseased trees, killing stumps, and burning bark; and a forester will be connected with the work, for the purpose of advising with regard to the use of the diseased timber. I might call attention to the fact that our state agricultural law, as it now reads, empowers our Commissioner of Agriculture to quarantine against this or any other dangerous fungous disease,—a very broad step from what it was before that time, when the only fungous disease he had any power to act against was the black knot of plums.

Mr. Reed: From the chart, it appears that the disease is more common in the vicinity of streams and bodies of water.

Professor Reddick: That is an observation that has often been recorded.

Mr. Reed: How is it elsewhere than in New York?

Professor Collins: The question has been asked more often than otherwise, why do we find the disease on the tops of hills away from the water? I think there isn't a sufficient amount of evidence or observation on that point to say whether it is more common near or away from bodies of water.

I will call your attention to one experiment that can be performed by anybody with the microscope. Take a piece of one of those spore horns or threads, put it in a drop of water on a microscope slide. Inside

of two minutes, it will disappear entirely. It is dissipated in the water, and the spores are so small you cannot see them with the naked eye. If you let the water dry on the slide, then put that slide under the microscope and try to blow those spores off, you can do it just about as easily as you can blow the shellac off a door. You can brush that film under the microscope, and you can't see that a single spore has been disturbed. The explanation, I think, lies in the fact that these spores are of a mucilaginous nature, and when they dry, they stick to whatever they come in contact with. That does not mean that these spores cannot be blown, because they may lie on fragments of leaves and be blown about by the wind. Again, some of the spores may be detached in a mechanical way and and thus blown by the wind. But I am quite convinced that the spores are not blown broadcast, simply because they are of a sticky nature.

Now, those spore threads are forced out under certain conditions, moisture conditions, as a rule. It has been shown after repeated observation that these spore threads are pushed out a day or two after a rain. Of course, in the springtime, the atmosphere is much more moist than later in the season. Consequently, we find more of these spore threads in the spring than at any other time. You will recall that the last week of August this year was a week of almost continuous rain. Two days after that ceased, I saw as many of these spore threads as I had seen at any one time all summer. So that, although conditions are best in the spring for greater abundance of these spores, they may occur at any time. If a bird alights on these spore masses, there is no reason that I see why they should not be carried. We know the rain water running down the trunk dissolves these spore masses, and they are carried down, there to reinfect the tree when insects crawl around.

President Morris: My brother has some Japanese chestnuts twenty-five or thirty years of age. By cutting off one branch at a time as fast as they blighted, he has saved those trees.

Professor Collins: You spoke, Doctor Morris, of grafting Japanese on to American stock. I have seen repeated cases where the Japanese has been grafted on to American stock. The whole Japanese tree has been killed, and we find the disease has killed the tree by girdling the American stock below the graft.

President Morris: Yes, I find this over and over again. In one case where I had a very choice variety of Burley's chestnut, the *Diaporthe* attacked the American stock underneath this, and had practically girdled it when I saw it. There remained a fraction of an inch of good bark. I cut off all except that, and put tar over it, and grafting wax over that, and this year the graft has grown a foot or more. So by

giving a great deal of attention to some one little injury, we can overcome the effect of it.

Mr. Jensen: In your grafting, what was the relationship of the rapidity of the growth of top after grafting, compared with the old stock?

President Morris: When these grafts are put on the stock, on rapidly growing shoots from a large root, they grow enormously, and sometimes we have had nearly one hundred feet of growth in one year. That, however, would be a chestnut like the Scott or the Ridgely. We frequently get thirty, forty, or fifty feet growth in one year.

Mr. Jensen: Does the plant grow more rapidly when it is grafted than on its own stock?

President Morris: I have not grafted Japanese on Japanese stock, but the Japanese and Korean grafted on American stock does grow more rapidly than it does on its own roots.

Professor Craig: Mr. Hall has another interesting instance of chestnut blight.

Mr. Hall: On the ground where the blight appeared, there were four chestnuts set by a nurseryman, two Japanese and two European chestnuts. Of the European chestnuts, one has succumbed to the blight, and the other has been continually attacked for the past four or five years, twice in a period of four years, and it is still alive and recently appears to be in a more healthy condition than for the past four or five years. During that time it has never borne any chestnuts. The companion tree of the same kind was girdled in two or three years.

President Morris: There is comparative resistance. Some of my trees went down instantly, and went all to pieces, while others stood up for four or five years. Chestnuts of the Paragon type I hoped were going to be fairly immune, but they are going pretty fast. I have advised people who have asked about Paragon chestnuts to buy them, but be prepared to have to cut out blighted branches as they appeared. It is a question whether I can advise even buying them much longer, because I have lost nearly all my Paragons, but they have not gone as fast as the Americans.

Doctor Deming: Ought we not before we leave this subject either to appoint a committee, or to pass resolutions urging action on the part of the state similar to the action taken by Pennsylvania in attempts to limit this disease? I would make such a motion, that the Northern Nut Growers' Association urge legislative action similar to that already taken by the State of Pennsylvania to limit the spread of the chestnut bark disease.

Mr. Littlepage: I second the motion. (Carried.)

Professor Craig: Should not the Secretary be empowered to send a copy of those resolutions to the Commissioner of Agriculture? I think the motion includes that.

Mr. Reed: It seems to me that this disease is of as much importance to other states as it is to New York and Pennsylvania, and that this sentiment, as this action can only be a sentiment of the Association, should be sent to the Commissioner of Agriculture in other states, as well as in New York. This is not the New York Nut Growers' Association. I would make that as a motion, that the sentiment of this Association in favor of state action similar to that of Pennsylvania be pressed upon the Commissioner of Agriculture in each state where that disease is prevalent.

President Morris: Shall we make Mr. Reed's motion take the place of Doctor Deming's?

Doctor Deming: I would accept that as an amended motion. (Carried.)

Professor Craig: Inasmuch as we have gone that far, should we not take another step, and that is, fearing lest the United States Secretary of Agriculture should feel slighted, should we not as the Northern Nut Growers' Association draw his attention to the fact that here is a serious disease sweeping over the whole northern part of the country, representing a very considerable portion of his domain, and ask his aid and cooperation with the various states which are attempting to do such good work?

President Morris: Will that have to go as another motion or as an amendment to Doctor Deming's?

Professor Craig: I move that a resolution of a similar type be passed, and forwarded to the Secretary of Agriculture of the United States. (Carried.)

Mr. Wilcox: May I ask some of the gentlemen who have experience along this line if we may look for any cure or help for it in the future, and if so, along what lines will it be possible, along the lines of isolation, of natural enemies, or some other preventive or cure?

President Morris: Yes, I would like to ask if anyone has a definite proposition beyond the one that has been proposed, restricting it by cutting out the advance agents of the blight. I believe that has been the only proposition so far. We certainly can't kill off the birds that will carry off blight on their feet. We don't know if a fungous enemy is likely to follow it up, or if it is a weak species, brought into activity by certain conditions, which will be brought back to its normal mode of life again. I don't know that anything definite could be stated till we know more about it.

Professor Craig: Perhaps Mr. Collins or Professor Reddick might offer something in the way of suggestions on that.

Mr. Collins: I don't think that I have anything to propose beyond the points suggested by the President. I think there are a good many points which should be kept watch of, and I don't know any one that looks any more promising than the other, except perhaps this of cutting out the disease. But this is an expensive method.

Mr. Reed: Have you ever found any individual trees in infested districts that were immune?

Mr. Collins: Only the Japanese, but I think Doctor Morris has found the Korean even more immune. I shouldn't use the word "immune," perhaps, but "highly resistant" to the disease. I have watched quite a number of trees, in the midst of disease, which seemed to be resisting the disease. I explained it in some cases by the fact that the bark was very free from injury—maybe that was the reason why they did not take the disease so easily as they might otherwise.

President Morris: The next paper will be that of Mr. C. A. Reed of the United States Department of Agriculture on "The Present Status of Nut Growing in the Northern States."

NUT GROWING IN THE NORTHERN STATES.

C. A. Reed, Washington, D. C.

With the exception of the chestnut, no species of native nut-bearing tree has become of prominent commercial importance as a cultivated product in that portion of the United States lying east of the Mississippi and north of the Ohio and Potomac Rivers. The growing of foreign nuts has attracted greater attention than has the development of the native species. Almost with the beginning of our national history, the culture of Persian walnuts attracted considerable attention throughout the East, especially in the States of the Middle and North Atlantic Coast. The European and Japan chestnuts, the European hazels and the Japan walnuts have since come into considerable prominence in the same area.

Within the district so outlined, which comprises practically the entire northeastern quarter of the United States, there are few sections of large extent to which some species of native or foreign origin has not already demonstrated its adaptability to the soil and climatic conditions, or to some other locality of approximately similar conditions.

In order of importance, the species of native nut-bearing trees known to be suited to some portion of the area under discussion, the following list is probably not incorrect: The American chestnut (*Cas-*

tanea dentata); the shagbark (*Hicoria ovata*); the American black walnut (*Juglans nigra*); the butternut (*Juglans cinerea*); the pecan (*Hicoria pecan*); the shellbark (*Hicoria laciniosa*); and the hazels (*Corylus americana; Corylus rostrata*). The American beechnut (*Fagus atropunicea*, Sudworth) naturally belongs to this list, but as it is probably not under cultivation as a nut tree at any place in the United States, it will not be discussed at this time.

The principal foreign species which have been tried in the Northeastern States are: The European and Japanese chestnuts (*Castanea sativa* and *C. japonica*); the Persian (English) walnut (*Juglans regia*); the Japanese walnuts (*J. Sieboldiana; J. cordiformis* and *J. mandshurica*); the European hazels (*Corylus avellana* and *C. tubulosa*).

THE AMERICAN CHESTNUT (*Castanea dentata*, Marsh).

Representatives of the American species of chestnut are found native to a large area. The species seems to avoid extremes of temperature, cold, alkaline or acid soils, and an excess of moisture. It is apparently at its best in the sandy and coarse gravelly soils of the uplands from lower New England to the southern extremity of the Piedmont Plateau in the East and from the extreme southern part of eastern Michigan to northern Mississippi on the West.

Although the quality of the American chestnut is unapproached by most of the foreign species, comparatively little attention has been paid to its development, while considerable effort has been directed toward the introduction and cultivation of the large European and Asiatic species. Comparatively few varieties of the American species have been originated, and of these none have been widely disseminated. The one variety, which, because of its size, productiveness, and quality, has been extensively propagated and widely planted, is the Paragon. This variety originated at Germantown, Pa., and was introduced about 1888. It is believed to have originated from a seed grown from a nut obtained from a European seedling, then in one of the gardens of Philadelphia. This variety has been propagated very extensively both in the nursery and by grafting on native stumps and sprouts of cleared-over forest lands. In the nursery it is now chiefly grafted to seedlings grown from Paragon nuts. This variety is both precocious and prolific. In a 25 acre orchard of young nursery grown trees planted near Boonville, Indiana, during the spring of 1910, nearly every tree set a number of burs during the same season. From two or three to from fifteen to seventeen burs had to be removed from each tree in order to prevent over-taxation.

Mr. Charles A. Green of Rochester, New York, Mr. E. H. Riehl of Alton, Illinois, and Mr. G. W. Endicott of Villa Ridge, Illinois, are the

introducers of a number of improved varieties of the American sweet chestnut, illustrations and descriptions of which may be had upon application to these gentlemen.

The extreme severity of the chestnut blight throughout the section where it has made its appearance, the rapidity with which it has spread since its discovery, and the present practical impossibility of keeping it under control have put the future of the chestnut industry of this country much in doubt. As has already been made clear during the present meeting, this disease has resulted in the entire destruction of thousands of forest and park chestnut trees in the sections where it has appeared, and as evidence of the further apprehension with which the chestnut blight is taken into account by the authorities familiar with it, it may be well to state that at the last meeting of the Pennsylvania State Legislature, the sum of $275,000 was appropriated for use in studying and combatting this disease. Above every other question bearing upon the subject of chestnut culture, that of this disease is by far of the greatest importance to the prospective planter.

THE SHAGBARK HICKORY (*Hicoria ovata*).

This species is native to the greater portion of the area under discussion. It is not common north of southern Maine and is much less abundant than the chestnut in the lower New England and North Atlantic States. It is best adapted to regions of deep fertile soils well supplied with moisture, yet without standing water. It is very difficult to propagate by asexual methods and ordinarily requires from twelve to twenty years to bring it into commercial bearing. For these reasons exceedingly few varieties have been called to public attention. The location of several individual trees of superior merit to that of the average are now known and arrangements are being made for their early propagation.

The most practical means of obtaining young trees for nut purposes it the present time is to plant nuts from selected trees. This method will, of course, lead to the wide variation common with seedling trees, but until experienced propagators meet with better success in their efforts at grafting or budding this species than in the past, there is little use for the amateur to undertake it.

THE AMERICAN BLACK WALNUT (*Juglans nigra*).

The American black walnut is common to much the same general area as the shagbark hickory. It is much less exacting in its soil and moisture requirements than that species and is much more frequent within the same area. Its representatives, either native or planted, are found in almost every kind of soil and at nearly every degree of eleva-

tion from the well drained lowlands to the mountain sides. As with the shagbark, few varieties of the black walnut have been introduced. The same interest is now being shown by leaders in nut culture in their efforts to locate and insure for propagation superior varieties of black walnuts as with the shagbarks.

THE BUTTERNUT (*Juglans cinerea*).

The butternut or white walnut, as it is sometimes called, is one of the most neglected of our native nut bearing trees. In the forest it abounds under much the same conditions as does the black walnut, to which it is closely related. Its native range within the entire United States extends further to the East and North and is not found so far to the South or West as is the black walnut. Like the shagbark, it is generally less abundant within the area of its native range than is either the chestnut or the black walnut within their respective native areas.

So far is is known to the writer, not a single variety of the butternut has been introduced.

THE PECAN (*Hicoria pecan*).

The pecan is native to a very small portion of the area under discussion. North of the 38th parallel it is found native along the river bottoms bordering on the Mississippi River and its tributaries to Davenport, Iowa, Terre Haute, Indiana, and nearly to Cincinnati.

Scattered individual trees are by no means rare in Illinois, Indiana, Ohio, Pennsylvania, Delaware and New Jersey, as far north as the 41st parallel, and they are occasionally found in the lower parts of Michigan, New York and Connecticut. In rare instances, they have been reported near the Atlantic coast in Masschusetts.

It is doubtful if any of these northern trees which are well outside of the area included by the native range of the pecan have yet borne nuts of good size and quality to an important extent. The efforts to carry the pecan beyond the limits of its accepted range have thus far been mainly by the planting of seedling nuts. During the past 3 or 4 years, intelligent efforts have been made by several persons in the State of Indiana to locate wild or seedling trees of sufficient merit to justify their propagation as named varieties for northern planting. Already they have called to attention and are propagating as rapidly as possible the Indiana, the Busseron, the Major, the Greenriver, the Warrick, and the Hinton. Some of these varieties compare favorably in the matter of size with the average pecans of the South, and while none of those yet discovered are of extremely thin shell, in points of plumpness, richness, bright color of kernel and pleasant flavor one or two of these northern varieties are not excelled by any of the southern sorts. Scions

and buds from these trees have been used in the propagation of nursery trees, and already a few trees have been disseminated. Several nurseries are now propagating these varieties but all combined their output will necessarily be very limited for some years to come.

Somewhat in advance of the steps taken in Indiana two varieties, the Mantura and the Appomattox, have been introduced from southeastern Virginia by Mr. W. N. Roper of Petersburg.

The Mantura pecan is distinctly of the southern type,—large, thin shelled and a ready cracker. It has been disseminated throughout the North to some extent when grafted upon the stocks of southern seedlings. None of the trees are yet in bearing. It is now being propagated by grafting to stocks of northern seedlings and it is highly probable more hardy trees will be the result.

The Appomattox pecan has not yet been propagated to great extent. Since the variety was called to public attention, a horse stable has been erected immediately under the tree; and consequently, being greatly over-supplied with nitrogen, it has been unable to normally develop its crops. Good specimens, therefore, have not been obtainable for description during the past several years.

In the mind of the introducer, however, it is a valuable variety, and well worthy of further observation.

THE SHELLBARK HICKORY (*Hicoria laciniosa*).

The shellbark hickory is much less common and far less well known than is the shagbark. In its native range it appears in certain counties of central New York, eastern Pennsylvania and in parts of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Nebraska and Oklahoma. According to Nut Culture in the United States,* this species attains its "greatest development along the streams of southern Kansas and Missouri, Arkansas and Oklahoma."

The nuts of this species are considerably larger than those of the shagbark and of much thicker shell, and commonly do not have as plump kernels. Exceedingly few have been propagated.

THE AMERICAN HAZELS (*Corylus Americana; Corylus rostrata*).

Shrubs of these two species are often seen growing together throughout the greater portion of the area under discussion. The former (*C. americana*) is of somewhat the better quality. Neither has been propagated asexually or cultivated to any extent, but it is doubtful if any native species of the nut tree offers a more inviting field for improvement than do these two species of hazels. The same methods of

* Published by the U. S. Department of Agriculture in 1896.

searching out the individuals of superior merit to that of the general average for propagation by grafting and budding by which other nut trees are being improved should be followed with the hazels.

THE CHINKAPIN (*Castanea pumila*).

Except as a wild product, this nut has perhaps the least commercial importance of any species mentioned in this paper. A few cultivated varieties are in existence but the nuts are commonly looked upon by experienced growers as novelties rather than as products worthy of special attention. The species is merely that of a dwarf chestnut growing as a shrub instead of as a tree. It is less hardy than the chestnut, being evidently best adapted to the climatic conditions of the southern portion of the chestnut area and even farther south.

FOREIGN NUTS.

THE EUROPEAN AND ASIATIC CHESTNUTS (*Castanea sativa; Castanea japonica*).

It is probable that within the area under discussion greater attention has been paid to the introduction of European and Asiatic chestnuts than to any other foreign species. The former is a moderately strong grower usually, with a low, rather broad top. The latter makes a small tree chiefly of value for ornamental purposes. Both are grown principally from second generation seedlings, which seem better adapted to American conditions than do imported trees.

As in the case of the American sweet chestnuts the existence of these species in the United States is threatened by the swiftly spreading chestnut blight.

THE PERSIAN WALNUT (*Juglans regia*).

The Persian walnut was among the first nut species to be introduced. The area east of the Rocky Mountains within which it seemed most successful previous to 1896 was described in Nut Culture at that time as being "A limited area along the Atlantic Slope from New York southward through New Jersey, southeastern Pennsylvania, central Virginia, North Carolina and Georgia." Continuing, the same publication said, "The tree endures the winter in favored localities near the coast as far north as Connecticut, Rhode Island and Massachusetts, but has never been planted there except in a small way."

What was then said is still very largely correct. However, contrary to the construction which might be implied from the wording, there are few commercial orchards of Persian walnuts anywhere east of the Rockies; one, that of Mrs. J. L. Lovett of Emilie, Bucks County,

Pa., of from fifty to seventy-five trees, approximately twenty years of age, is bearing fully as well as could be expected under its present environment. The trees appear to be entirely unaffected by the severity of climatic conditions, but being seedlings altogether, and uncultivated, the crop production is irregular. Reports from northwestern New York and Pennsylvania indicate that this species may be safely grown in those sections when within the zones which are tempered by the influence of the Great Lakes.

Ordinarily the trees scattered over the Eastern States do not seem able to permanently withstand the severe winters, as in most cases they are not infrequently severely frozen back. In eastern Pennsylvania, Maryland, Delaware, New Jersey and New York City, the writer recently inspected numbers of fine trees apparently from 50 to 75 years of age which showed no indications of winter injury. The owners seemed to be entirely ignorant of the reputation of the species with respect to its inability to withstand severe weather.

The nuts from many of these trees were of such large size and good quality that a number are to be extensively propagated in the near future.

THE JAPAN WALNUTS (*Juglans sieboldiana; Juglans cordiformis; Juglans mandshurica*).

These nuts are of comparatively recent introduction into the United States, having been brought from Asia since 1860. All are generally hardy; the first two are rapid growers, very productive and serve to an excellent purpose as ornamentals; the last is well known. The nuts of the former two are smaller than those of our native black walnut, of about equally thick shell, usually of no better quality, and as yet are not in great demand on our markets. A few trees, however, should certainly be given a place about the home grounds.

THE EUROPEAN HAZELS (*Corylus avellana; Corylus tubulosa*).

Numerous efforts have been made to introduce these species into the Eastern states, but owing to the severity of a blight everywhere prevalent with the American species in this section, such efforts have usually met with failure. There have been very few instances in which either species has been cultivated in the Eastern states for any great period of time without being destroyed by blight.

The future of hazel nut production in this section evidently depends upon the development of our native species or by hybridizing with some of the foreign species.

In concluding this article, it may not be amiss to throw out the following suggestions as to the steps by which all may help in the development of the nut industry:

(1) Ordinarily, stick to the native species.

(2) Plant nuts or seedling trees only when budded or grafted varieties cannot be had, but do not fail to plant nut trees of some kind.

(3) Whenever a tree or shrub is located which because of the superior quality, size, thinness of shell and quantity of nuts appears to be worthy of propagation, specimens should be sent to the officers of this Association; to the State Experiment Stations or to the U. S. Department of Agriculture at Washington, D. C., for examination. (Franks for the mailing of such nuts to the U. S. Department of Agriculture without postage will be sent upon application.)

(4) Nut trees must be accorded the same degree of cultivation and horticultural attention given to other fruit-bearing trees, if commercial production of nuts is to be expected.

President Morris: This interesting paper is now open for discussion. I will start it by saying that the criticism of the Japanese walnut is correct, so far as it goes; but we have there a fine opportunity for good new work, and if the nurseries would take up this question in the right way, they could open up an enormous trade for stock. Let us take the *Juglans mandshurica*, and the *sieboldiana*, which have been distributed more than any others over this country because of the beauty of the trees. They grow rapidly, and are tremendously hardy, although not so much so as the best of the Japanese walnuts, the cordiformis. It was found on the Pacific Coast that the cordiformis went largely to wood. In the East, it bears well, is perfectly hardy and the nut is delicious. Individual trees bear thin shelled nuts, and individual trees bear large nuts. In fact, I have seen the nut quite as large as the nut of the average American butternut, and thin shelled, at that. The thing for the large nurseries is not to sell Japanese nuts under that name, but to sell the cordiformis, and sell only that, and only grafted trees. In that way we would get rid of the less desirable varieties, just as with the hickories a thousand and one shagbarks that we find are not remarkable, and yet we will find here and there one that is worth grafting and propagating. It is the same way with the Japanese walnuts, but particularly this cordiformis which is hardy and growing native in a climate which corresponds to Nova Scotia. If the nurseries will put out this nut, grafted, they will have a very valuable nut to give us. I notice that the speaker distinguished a "little shagbark." Now, I won-

der if that is not a question worthy of discussion right here. The names shagbark, shellbark, and scaly bark, are applied indifferently to *Hicoria ovata*, *Hicoria cinerea*, and *Hicoria septentrionalis*. We can distinguish them much better if we take different names for the little and the big shagbark,—if we call the little one shagbark and the big one shellbark, it makes a distinction; and the reason why that distinction seems legitimate is that the bark comes off like great sheets from the big shellbark, and the little shagbark has the scales of the bark coming off in smaller scales, shelling off. At the same time, it is more scaly than the other. If we call the shaggy one, *Hicoria ovata*, shagbark, and call the big western one shellbark, it seems to me a distinction that we may as well make in our discussions, and fix the names in such a way as to afford convenience.

Mr. Reed: My reference was to *Hicoria ovata*.

President Morris: Yes, that is for the little one, and if we call the *laciniosa* shellbark, that will make a distinction. Shall we call the little one shagbark, and the big shagbark shellbark, or must we always depend upon the scientific names in classifying?

Mr. Collins: May I call attention to another complication? To botanists who are not particulary nut growers, there is another tree which is known as the little shellbark,—that is the *microcarpa*, with a nut about one-half to three-quarters of an inch long.

Professor Lake: Have we a committee on nomenclature?

President Morris: We haven't appointed that committee yet.

Professor Lake: I was going to move that the matter go to them, with the suggestion that they take official action.

President Morris: Supposing we extend the function of the committee on the nomenclature of *mandshurica* to include this question of the naming of the shagbarks.

Doctor Deming: Then had we not better include the President, *ex-officio*, on that committee?

President Morris: We may as well begin, because there is no need of having this eternal confusion.

Doctor Deming: I have never been able to understand why more attention hasn't been given to the hazels. Here we apparently have a nut which is easy to transplant, which is perfectly hardy, which comes into bearing early, which bears a valuable nut—so valuable that when I went into a confectionery store in New York, I saw trays of nut meats lying side by side, and pecan meats were priced at $1.00 a pound and filbert meats were $1.25. I understand the only obstacle to the growth of the filbert, which might well fill the early waiting years of the nut grower, is the hazel blight. I tried to get information on the hazel blight from Doctor Waite of the United States Department of Agri-

culture, and also from Mr. Kerr of Denton, Maryland, who, I know, has grown hazels for a long time, and done it very successfully; but I have not succeeded in getting any accurate information on the blight, and as I understand it, no accurate experiments have been carried out in the treatment of the blight, or in its prevention. It seems as if the blight, being an external fungous disease, ought to be one amenable to treatment by sprays. I am not aware of any experiments which have been made with that object.

President Morris: Henry Hicks of Westboro has given as much attention as anybody to this matter. He made a great effort to introduce the European hazels for years. They all went down with the blight. Specimens of the blight you can get without difficulty.

Doctor Deming: Did he practice spraying experiments carefully?

President Morris: He told me he had tried all. What have the Meehans done?

Mr. Wilcox: They have never had any trouble with the blight.

President Morris: How long do they keep them in the nurseries?

Mr. Wilcox: We keep them to six or eight feet.

President Morris: Do you have the common hazel abundant?

Mr. Wilcox: Yes, along the water courses.

President Morris: This blight is more apt to attack the exotics, and over where Mr. Kerr lives there are no native hazels. He happens to be on an island. He started Europeans where we have no American hazels, so that accounts for his immunity.

Mr. Reed: His trees are practically all dead now. He has given up.

President Morris: That has been the history everywhere. That is the last instance I have been able to find of successful raising of hazels. One line, it seems to me, offers promise—that is the making of hybrids. I am making hybrids between the American hazel and various European and Asiatic.

Mr. Rush: I have had some experience with the hazel. I have exchanged with Mr. Roody of Washington. He has sent the Barcelona and Du Chilly, and they are growing very hardy without the least indication of blight. There are two kinds of American hazels. I have them growing as large in the bush as twenty to twenty-five feet. And then we have a small bush. The small type is worthy of propagation. The Barcelona and Du Chilly are thickly set with catkins this fall, and by all indications there will be a very nice crop next summer.

President Morris: The rule is they begin to blight about the fifth year. About the eighth they are gone.

Doctor Deming: Isn't that a most promising field for experiment, in producing blight-free varieties, and also in spraying?

President Morris: As I understand it, this fungus lives in the

cambium layer of the bark, very much as *Diaporthe parasitica* does, and at such a depth that spraying is not much advantage. The fungus does not attack the native hazel, except when it has been injured.

Professor Craig: We haven't heard from Mr. Barron.

Mr. Barron: I don't know that I have anything to say. I came here to gather some information. I am chiefly interested in the possibility of the use of nut trees for landscape effect.

President Morris: This belongs right with this paper, because the uses of nut trees are not limited to the nuts for fruit purposes. Their decorative value is one Mr. Barron brings in very properly, and it seems to me we may replace thousands of practically useless trees in the parks with wonderfully beautiful nut trees. What had you in mind particularly? Had you thought it out?

Mr. Pomeroy: The nurserymen must have done something to induce people to set out horse-chestnuts. There can't be anything more unsightly. It is always shedding something in the way of filth. There are two or three varieties of Japanese walnuts that are beautiful, at the time of year when they are in blossom, with that long, red blossom. It seems as if the nurserymen might do something to induce people to set out these.

President Morris: What could be finer than your English walnuts?

Mr. Barron: Mr. Hicks has given up hazel, but right close by Mr. Havemeyer is starting right in again. He has had them there for two years.

Doctor Deming: One of my correspondents wrote, asking me what varieties of nut trees were most rapid growing and best for shade or screens. I think that is a very good subject for investigation.

President Morris: We can discuss it right here.

Doctor Deming: I said the most rapid growing trees were the Japanese walnuts, and perhaps the best for screens were the Japanese chestnuts. I should hardly know what to say are the best for shade, because all of the nut trees are so good.

Mr. Reed: It would depend very largely on the locality. Of course, there are some of us here who are disciples of the pecan, and where you can grow the pecan successfully, it is doubtful if there is a prettier shade tree and one that makes less litter, or that grows faster. Some of the hickories—the mocker-nut especially, *Hicoria alba*, makes a very beautiful growth, and has a dense foliage of rich, dark green. For other purposes, there is no prettier tree than the chestnut, aside from the blight. It grows to greater size than most of the hickories and more rapidly. The Japanese chestnuts I am not familiar with. The butternut is not usually a compact enough grower to be a beautiful tree, but the black walnuts and certain of our hickories, the rapid growing

hickories, are very fine, and this Rush chinquapin, I expect, would be very fitting for hedge planting. It is a very compact grower, and grows up about fifteen or twenty feet, making a very pretty tree. But every one of these trees we are mentioning has its particular place in the landscape. You can't use any one of them in all places.

President Morris: The objection to black walnut and butternut is the early loss of leaves in autumn. I have heard others speak about it as an objection. Among the rapid growing ones, there is no doubt the Japanese walnuts are tremendously rapid growers, during the first few years. For screen purposes, the chestnuts and chinquapin certainly would do remarkably well. We have forgotten the beech altogether, simply because we haven't been classifying it as a nut tree. But the nurserymen can put out beech trees grafted from trees that bear fine, valuable nuts, and give us the beech as a tree of double value.

Mr. Reed: Dr. Deming raised the question as to why the hazel nut was not given more attention. It occurs to me that we have an analogy in the pecan situation. The pecan is native up and down the Mississippi River and out in Texas, and in that district you will find that a great deal less attention has been paid to development of varieties of the pecan as an orchard tree than farther east. All through Mississippi, Alabama, Georgia, and Florida, we find new varieties by the scores. It seems to be a case of distance lending enchantment.

Professor Lake: Going back, I wanted to ask you, Doctor Morris, if in your work of reproducing the hazel, you had used the Pacific Coast hazel for stock.

President Morris: Yes, the Pacific Coast hazel is really the same species as ours, only it grows thirty or forty feet out there, and I have seen it nearly thirty feet high up in the Hudson Bay country. In some of the rich valleys in the far North, both on the Pacific and Atlantic Coasts, the hazel becomes almost a tree. I have used it for grafting stock, but I haven't used it for crossing as yet. I have a lot of hazels ready for pollenizing next spring.

Professor Lake: It seems to me it would be a most excellent thing if this Association could do something in the way of stimulating the improvement of varieties of the native hazel. I can't help thinking that bush is entitled to much more attention than we have given it in the past.

President Morris: Some work has been done along that line. I devoted the entire nut-collecting part of one year to studying the hazel. I went over many thousands of hazels. One day, when I asked a neighbor if I might go over his grounds, he said, "Yes, but what better hazel do you want than that one that grows above your north bars?" He said, "We have known of that for one hundred years about here." He couldn't find it. Finally it was found, covered by a ton of grape vine.

It has wonderful hazels on it. I have transplanted it. It is a large, thin-shelled, fine hazel, but a shy bearer. I have three very fine American hazels I am going to use in crossing. This big, thin-shelled one is a wonderful hazel, except that it is a shy bearer, and it is difficult to transplant. I have transplanted four American hazels, and it took me about two or three years to get them under way. It is a nuisance with us. It grows in our pastures so rapidly the cows have to get out of the way—crowds everything out. I have no doubt a great deal more work will be done with the hazel. Now my bushes are all ready for pollenizing. I have crossed a lot of them this year.

Professor Craig: I think Mr. Barron's point in reference to the ornamental or esthetic value of the nut trees is very well taken, indeed. It is a fact that nurserymen have paid more attention in the past to those forms which are particularly striking in some way, rather than to the forms which are actually and intrinsically beautiful. Anything which has variegated leaves or purple leaves is sure to catch the eye. As a matter of fact, I believe there are few trees which are more picturesque than the hickories here in New York. The summer season is not the season in which they carry their most beautiful forms. The winter is the time when we see that picturesque framework standing out against the sky, distinctive in every respect.

Mr. Collins: Isn't this subject one in which the Association might interest itself?

President Morris: I have found that nurserymen to whom I have talked for the most part were men of naturally esthetic taste, but dropped their esthetic taste in order to adjust themselves to economic principles. If a customer says, "Please give me a thousand Carolina poplars," the nurseryman knows these will be beautiful for about fifteen years, then ragged and dead and unsightly; but the customer wants them, and the nurseryman has to furnish Carolina poplars.

Mr. Barron: The nurseryman, as a rule, doesn't take much trouble towards educating the people up to the better stuff.

President Morris: I believe that, if the nurserymen make a concerted movement—or not necessarily a concerted movement—if any one firm or two or three firms will make a business of introducing beautiful, useful trees of the nut-bearing group, they will open up a new group People just haven't thought about it. They give an order for trees in a sort of perfunctory way, because they must have them.

If there is no further discussion, we will go on to the Indiana pecan, by Mr. T. P. Littlepage, and this will be the last paper of the afternoon.

THE INDIANA PECAN.

T. P. Littlepage, Washington, D. C.

The subjec of the northern pecan is one that I have been interested in for more than thirty years. Away down in Spencer County, Indiana, on the banks of the Ohio River, stand many large native pecan trees, and some of my earliest recollections and most pleasant experiences are connected with gathering the nuts from under these large trees; and, without realizing it, I acquired much of the information in those early days that has of late enabled me to carefully discriminate between the desirable and undesirable varieties of pecans, viewed from the standpoint of one who propagates them for orchard purposes. My interest in the various points connected with pecan growing was at that time a very direct interest, and the only motive I had for determining various facts was the fundamental motive which largely dominates the world today, and that is the question of securing the thing we desire for our immediate use.

The large, magnificent pecan trees growing on the banks of the beautiful Ohio year after year became a matter of the deepest interest to me. I have seen the Ohio surging swiftly through their branches in the winter, have seen them withstand the storms and vicissitudes of snow and ice and raging floods; and as the spring came on I have beheld them, with more or less surprise and pleasure, laden with blossoms. As summer advanced, I watched the growing clusters of delicious nuts; and as the nuts began to ripen in the fall, I soon learned to pick out the best bearing trees. It was not a matter of science or unselfish research that enabled me to determine the fact that some trees rarely ever missed a crop, while others were very uncertain; that some nuts were large, thin-shelled, and of fine flavor, while others were small and hard to crack, and otherwise undesirable; that some of the trees ripened their nuts early, long before frost, while others seemed to hang on and resent the coming of autumn with all their might. At the age of nine, I could take many different varieties of Indiana seedling pecans, separate them, and locate the trees from whence they came, and give the essential points of their bearing record. I could also tell whether the respective owners watched them very carefully, kept a dog, or lived at a safe distance away, all of which points were just as essential so far as I was concerned as the size of the nut and its quality. The pecan captured me early in life, and I have been a willing victim ever since. My interest in this nut of late years is based on more scientific principles, but I doubt if the facts arrived at are any more reliable than the facts which came from the simple desire to appease a boyish appetite with the best nut that nature has ever produced.

When I was about fourteen years old I came into personal possession of twelve acres of land which had descended to me from my father's estate. The land was almost valueless for general cropping purposes, but I had already, at that age, determined something of the value of a pecan orchard, and I proceeded to gather nuts from the best trees in that section, and the following spring planted the whole twelve acres in pecans. I knew, however, that even though the ground was not very productive it would have to be cultivated that summer, so I planted the pecans around stumps where the young trees would be protected. My information as to the value of pecans was accurate and unerring; however, there were several things I had not taken into consideration. First, that a pecan that is kept in the dry all winter is very slow to germinate in the spring, and in fact the percentage of them that does germinate is very small. Second, that the field mice have an abiding hunger for pecans. Third, that the pecan does not come true to seed, and that an orchard of seedlings is of very questionable value. The first two facts, which I failed to take into consideration—that is, the poor germinating qualities of a dry pecan, and the appetite of the field mice, relieved me from the embarrassment of the third, for it is needless to say that this attempt made twenty-five years ago was a complete failure, and for the time being discouraged my ambitions in this direction. But after many years they revived sufficiently to stimulate me to action again in the line of pecan culture.

I mention the above facts merely to show my credibility as a witness on this subject. Being a lawyer by profession, I have learned long since that the value of one's opinion, and especially the value of testimony is directly in proportion to one's knowledge of and interest in the subject matter at issue. Therefore, trusting that I have sufficiently established my credibility, at least to my own satisfaction, I shall proceed to make some observations relative to nut culture in the North.

First, let me say that I most heartily endorse the line of work undertaken by our Association—that is, the work of collecting and diffusing information in reference to nut culture that will be valuable to the prospective grower. Our southern brethren have very largely passed this stage in nut work in the South. They still have many problems before them, but the fundamental problems of the determination and propagation of the most desirable varieties of pecans have been already worked out and they are producing in their nurseries hundreds of thousands of fine budded and grafted pecan trees. There is such a lack of information on this subject in the North that it is indeed opportune that our Association should at the beginning of the interest in nut culture in that section take up these various question and give the public the benefit of our experience and information in reference to them. There are

yet many people who think that you cannot transplant a pecan tree, and that if you cut the tap root it will not produce, while the fact is that the pecan tree can be transplanted with almost as much success as can fruit trees. Two years ago I transplanted a number of cherry trees. At the same time I transplanted some pecan trees, and I had a higher percentage of loss among the cherries than among the pecans. There are some who believe that it is even a benefit to cut the tap root. I have never belonged to the school which endorses cutting the roots of any tree to accelerate its growth, except, of course, where it is necessary to take up a tree and reset it, in which case it is necessary to cut some of the roots. It is unquestionably true that if the roots are cut too severely the tree receives too great a shock, but the pecan tree seems to recover as quickly as any other variety of tree. However, there are hundreds of farmers today who would not undertake to raise pecans, for the reason that they think they cannot be transplanted. Also, in every community where the pecan is native, can be seen many seedling trees ranging anywhere from ten to twenty-five years old that have never borne a nut. These trees are pointed out by the general public as horrible examples of the uselessness of attempted pecan culture. Near my home at Boonville, Ind., is a row of seedling pecan trees planted in a garden. The trees are now old enough to bear a half bushel of pecans every year, but so far as I know they have never borne a nut. The general public throughout the North and Middle West have not yet learned that the average seedling pecan is an uncertain quantity, grows slowly, bears irregularly, if at all, and probably inferior nuts. However, once in a while, nature, through her wonderful workings, has produced a tree that bears large crops of fine nuts regularly, and when the seedling pecan is grafted or budded from this kind of tree the trees so propagated take on the qualities of the parent and begin bearing very early. I have frequently taken pictures of small pecan trees not over three feet high, each bearing a cluster of large, fine nuts. This, of course, is unusual, but shows the tendency of the grafted or budded tree. I mention the above two points not for the purpose at this point of entering into a discussion of the propagation of the pecan, but to show the necessity for general enlightenment on the possibilities, and to dispel some of the bug-a-boos that exist in the minds of many persons. Those of you here who have engaged in the various phases of nut culture may think these points primitive and unnecessary, and they are, perhaps, unnecessary to the expert, but it is my pleasure every summer to spend considerable time in the rural sections of the country, and it is surprising how very little is known, even by our most enlightened farmers, on the subject of nut culture. I have made many trips throughout the South, and I find the farmers in that section have read the various proceedings of the

National Nut Growers' Association until a knowledge of nut culture throughout the South is becoming very general. It is, therefore, the duty and the province of the Northern Nut Growers' Association to diffuse as much information as possible among the farmers of the North and Middle West on this subject.

This is important for many reasons. At a recent meeting of the National Nut Growers' Association held at Mobile, Ala., in discussing the subject of the Extension of the Pecan Area, I used the following language:

"In my opinion nothing is more important to the permanency of the pecan industry than the development of the pecan area in different parts of the country, and having orchards cultivated under as many different conditions as are consistent with the known probable successful area. This is important, for the reason that this more than anything else will insure a supply of pecans each year, and this will develop a public dependency upon this most valuable nut. Nothing can be more detrimental to any industry than a spasmodic and irregular supply of the product upon which that industry depends."

I quote this language for the reason that the culture of the pecan in the North is just now in its infancy, and it is peculiarly the function of our organization to get before the public the essential facts upon which its success depends. We are under great obligation for the work that has been done in the South and the information that is made available through the National Nut Growers' Association. Much of this is valuable in the North, but there are a great many of the essential points that have yet to be worked out, as the climatic conditions make it impossible to follow exactly in all cases the line of work that has been done in the South.

The fake promoter and the crooked nurseryman will no doubt come in for their inning in the North, as they have in the South, and the public will be imposed upon by inferior and "doctored" trees, and all sorts of get-rich-quick orchard schemes will no doubt make their advent throughout the North; but it is very probably that our Association, through its proper committee, having in mind the experiences of the South, can keep closely in touch with the general work that is going on and have on hand sufficient information to protect those who will take the trouble to make inquiry. Nothing in the horticultural line is more satisfactory, more beautiful or more valuable than a fine young grove of grafted or budded pecan trees of good varieties; but like all other good things, it will attract the counterfeiter.

Coming now more specifically to the subject which has been assigned to me by the committee—that is, "The Indiana Pecan and My Experience in Nut Culture," I want to explain what is meant by the

"Indiana pecan." It is true, of course, that some of the very finest of the northern pecans have originated in Indiana, yet I prefer to speak of pecans in that whole section of the country as belonging to the "Indiana group." Taking Evansville, Ind., as the center, there grow, within a radius of fifty miles, in Indiana, Illinois and Kentucky, many thousands of wild pecan trees; and after an investigation extending through a number of years, there have been selected from these various wild groves a few trees from which it has been deemed desirable to propagate. In this connection I want to mention the valuable work that has been done along this line by Mason J. Niblack, of Vincennes, Ind.; Prof. C. G. Woodbury, of Lafayette, Ind.; R. L. McCoy, of Lake, Ind.; and J. F. Wilkinson, of Rockport, Ind. These men, with the assistance of others throughout the State, have for several years been making investigations of these pecans with a view of determining the most desirable varieties from which to propagate. It has been my privilege to have the benefit of the information gathered by these gentlemen, which, added to my own experience, has given me a fairly comprehensive view of the desirable nuts in that section, and, as the geographical center of the present known dsirable varieties seems to be about Evansville, Ind., I will, for matter of convenience, designate them as belonging to the "Indiana Group."

We have been able to determine with some certainly the desirability of six or seven varieties of pecans for propagating purposes. We have a number of others under observation. In investigating a pecan for propagating purposes, it is necessary to examine it from two standpoints, first, the tree qualities, and second, the qualities of the nut itself.

The tree must be of a thrifty nature, a rapid grower, not especially subject to any particular diseases, must bear regularly, and the crops must be of a good average as to quantity. When observing a great number of pecan trees, it soon becomes apparent that some varieties grow much faster than others. This is first noticed in the nursery rows, and it is highly desirable to select not only those varieties which grow fast, but even the best growing trees of any particular variety. Most of the trees from which propagating is done are generally full grown, and it is sometimes difficult to tell from observing them in the woods what their growing qualities are, yet it is occasionally apparent from observing a tree that it is thrifty and strong, while another tree may look entirely different. The growing quality, however, does not usually become apparent until after they are propagated and put under proper conditions of cultivation.

The bearing record of a tree can be determined only by observing the tree for a number of years and measuring its crops. There are many trees that are almost infallible producers, but some years the crop is

lighter than others, although it is not probable that an orchard, even from one of these unusual bearers, can be obtained which will not occasionally miss a crop.

The influence of the stock upon the scion is something that has not yet been fully worked out, and for that reason it is impossible to say why the grafted or budded tree does not always take on the bearing qualities of the parent, although it is pretty safe to say that as a rule its qualities are very closely approximated, and by careful selection it is possible to get grafted and budded trees that begin bearing very early and bear with a great degree of regularity.

In visiting a tree while the nuts are green, one can get some idea as to its bearing quality by the number and size of the clusters hanging on the limbs. A tree that is a poor bearer, or bears only a fair crop, usually bears its nuts in clusters of one to three, while a good bearer produces clusters of from three to six. I have seen as many as eight nuts in a cluster in the South, and have seen some clusters of seven on some of our Indiana trees, but as a rule good bearing trees of the Indiana group have clusters of about four to five nuts each.

After the tree qualities have been determined, it is then necessary to consider the nut itself. The nut must be of fair size, of good flavor, thin to medium thickness of shell, well filled, and of good cracking quality—that is, the conformation of the shell and kernel must be such that a large percentage of the kernels can be taken out as whole halves, and the convolutions of the kernels must be wide enough that the partitions do not adhere to them. When all of these qualities, both of the tree and nut, can be combined, we then have a desirable tree from which to propagate, and it is very surprising how few come up to the standard. In one wild grove in Kentucky, on the banks of the Ohio River just across from Indiana, near the mouth of the Green River, there are nearly 300 acres of wild pecan trees. In this grove are perhaps more than a thousand trees, and so far as I have been able to determine up to date, there are but three trees out of the whole grove that come near my notion of the standard.

Sometimes, however, a tree or a nut may grade up so high on some one point as to make it a desirable variety from which to propagate, even though it does not grade high on other desirable points. For example, one of the most desirable southern pecans, perhaps, considering only the nut itself, is the "Schley," yet the tree is reputed to be of very medium bearing quality. The nut is so very fine, however, that no southern grove of pecans is complete without a fair percentage of "Schley" trees. On the other hand, the "Stuart," another southern variety, has not ranked nearly so high as the "Schley," considering only the nut; and yet there are probably twice as many "Stuarts" being

put out in the South today as any other variety, for the simple reason that it is a good-sized nut and the tree has a very fine bearing record. All these things have to be taken into consideration by those of us who are undertaking to propagate northern varieties.

There is unquestionably a large area of country extending approximately from the latitude of Atlanta, Ga., to that of Terre Haute, Ind., in which there is a great field for experimenting with the northern varieties of pecans. It is a great mistake to undertake to bring the southern varieties too far north. A majority of the finest of the southern varieties originated on the Gulf Coast, and it is true that they can be brought a considerable distance north of there, but I have always doubted their successful growth with any degree of certainty of crops north of Atlanta, Ga.; for I think it is pretty well conceded that if one undertakes to crowd the northern limits with the southern varieties of pecans, they become uncertain in their bearing habits and the pecans are much smaller and not as well filled. On the other hand, it is my opinion that the northern pecan can be taken south of its origin with complete safety. The longer growing season will probably add to the certainty of the crops and the size of the nuts. It is also very important for the grower of these northern varieties of pecans to recognize the fact that they cannot be taken too far north of the location of the parent tree. The limits, however, both of the northern and southern varieties are not arbitrary, as they depend very much upon proximity to the ocean and other moderating influences. For example, it is very probable that pecans can be cultivated much farther north close to either the Atlantic or Pacific Coast than they can in the Middle West. All of these things remain yet to be determined, but it is important to distinguish between the setting of orchards for commercial purposes and the setting of trees for purely experimental purposes.

There is unquestionably a great section of the country comprising approximately, as I have said, the territory lying between the latitude of Atlanta, Ga., and Terre Haute, Ind., in which pecans can be commercially produced successfully. In the near future I expect to see pecan orchards of these northern varieties producing fine nuts and bearing as regularly in the northern sections as they do in the South. The prospective orchardist, however, must look well to the varieties which he selects and the latitude of the parent tree from whence they come and the geographical conditions that influence the weather.

I have referred to Evansville, Ind., as being about the center of the Indiana Group. The average fall frost period at Evansville is about the 20th of October. The average period of the last spring frost is about April the 9th. This will serve somewhat as a guide to the prospective commercial orchardist. However, most of the trees of the In-

diana Group do not pollenate until about the 10th of May, and the great majority of them ripen their nuts by the 15th of October, and several of the good trees ripen their nuts by the 1st of October, though they usually are not gathered till later.

The northernmost tree, so far as I know, that has been deemed worthy of observation is the "Hodge," which is native in Illinois, about eighty-five miles north of Evansville, Ind., and a few miles southwest of Terre Haute, Ind. It is one of the largest of the northern varieties, and is a fair nut, but does not grade high in filling qualities, and the bearing record of the parent tree has not yet been determined. The tree is crooked and very unprepossessing looking, and stands in the woods where it has a very poor chance. When I visited it this year, it had a very light crop of nuts, but I did not condemn it, for the reason that any tree growing under the same conditions could not be expected to bear very well. I expect to observe the tree for several years in the future, and determine further as to its bearing record. It is possible that trees propagated from this variety, under favorable conditions, may prove to be good bearers.

The next northernmost trees of the desirable varieties are the "Indiana" and "Busseron," standing about 100 yards apart, west of Oaktown, Knox County, Indiana, about sixty-five miles north of Evansville. Mr. Mason J. Niblack, of Vincennes, Ind., has had these trees under observation for a number of years, and it is due to his interest that they were brought to the attention of the public. The "Busseron" is an old tree that is reputed to have a very fine bearing record. A few years ago, the owner of this tree cut all the top out of it, and this crippled the tree very badly and set it back for quite a while. When I visited it last August, it had put up new growth, and the few remaining old limbs that had been left on it were hanging full of clusters containing four and five nuts each. "The Indiana," standing a short distance away, is a comparatively young tree, and is thought to be a seedling of the "Busseron," as the two nuts resemble one another very much. The "Indiana" has been cut very severely for grafting wood the last few years, and it is therefore difficult to give very authentic information as to its bearing record. It appears, however, to be a very promising tree, and when I visited it in August it had a fair crop of nuts. The clusters were not large—mostly two and three each. The tree looked very thrifty, and from the best information that I have been able to gather in reference to it, I consider it a desirable variety from which to propagate. My choice of the two trees is the "Busseron," although the "Indiana" has made an excellent showing, considering the severe prunings for grafting wood.

Coming down near the center of the Indiana Group, we have the

"Warrick," growing in Warrick County, Indiana, which took the prize at the pecan show at Mt. Vernon, Ind., in 1909, and is a fair nut of more than average size. It is reputed to have a good bearing record, but I have not yet had opportunity to completely verify this.

In Posey County, Ind., near Evansville, are hundreds of wild pecan trees, many of which produce good nuts. One of them, from which I propagated last year under the name of the "Hoosier," is a very prolific tree. The nut itself is of medium size, beautiful color and thin shell, but the kernel qualities are not nearly so desirable as many of the other of our Indiana pecans, and it does not take a very high rank in the estimation of some of our observers. I visited the tree in August, 1910, and at that time it had one of the most bountiful crops of nuts that I had ever seen growing on a tree. It was hanging full of clusters containing five and six nuts each. I visited it again in October and found that the nuts had ripened very early. This nut took the prize at the Mt. Vernon pecan show in 1910.

Crossing the river from Indiana, we have in the Major woods at the mouth of Green River, nine miles from Evansville, three desirable pecans—the "Greenriver," the "Major," and the "Hinton." The "Major" and the "Hinton" have been propagated by Mr. William N. Roper, at Petersburg, Va., for some time. They are round, well filled nuts, and are considered by confectioners as the most desirable type of pecan for many of the confectionery purposes. The "Major" is the best cracking pecan that I have ever seen, either North or South, and is a regular bearer, but not as high in flavor as some other varieties. The "Hinton" is an oval-shaped nut, having a corrugated shell, of fine cracking and kernel qualities, but I have not yet satisfactorily determined its bearing record.

The "Greenriver" is a little larger than either of the above nuts, and is one of the very finest medium-sized pecans that I have found. The tree is reported not to have missed a crop in eleven years, although the crop this year was very light, probably owing to the fact that it was cut pretty severely last year for grafting wood. All three of these varieties coming from the Major woods at the mouth of Green River give excellent promise, with perhaps the "Greenriver" in the lead for general qualities.

Down on the banks of the Wabash in Posey County, Indiana, and across on the Illinois side, are several very fine, large, beautiful varieties of pecans, which Mr. R. L. McCoy, of Lake, Ind., and myself are observing. Several of these pecans are as large as many of the standard southern varieties, and when I visited the trees this year in August, they were bearing good crops of nuts. We have not yet named these varieties, but expect to do so after we have observed them the coming

year. There are one or two varieties in this neighborhood that may take rank over all the northern pecans that have been discovered. It is no longer a question of finding nuts in the North of good size, for we have already located some that rank well with many of the standard southern varieties in size, and one of the surprising and favorable points of the northern pecan is their fine filling qualities and high flavor. When placed on the scales their weight is most surprising to those who have not tested them.

The problem before the prospective pecan grower in the North is to secure good trees of these most desirable varieties. Seedling trees are not worth setting out. Until last year the successful propagation of pecans in the North was doubted by many, but the experiments conducted by myself and Mr. R. L. McCoy, at Lake, Ind., who worked in conjunction with me, have demonstrated that they can be successfully propagated. A number of points, however, must be carefully observed in this work.

First, in reference to grafting: The grafting should be done on northern two-year-old stocks. One-year-old stocks can be used, but two-year-olds are thought to be better. The stocks must be grown from northern seedlings. There is no place in the North for the southern stock, and right here let me suggest that the individual who buys northern trees grafted on southern stocks or southern trees grafted on northern stocks is throwing his money away. I set fifty trees last fall of the "Indiana" grafted on southern stocks, and the first freeze that came promptly killed them all. They put up a few new sprouts last summer, but finally the roots rotted, and this fall I dug them up. I have a neighbor who put out an orchard of southern grown trees. Some of them seemed to grow all right for six or seven years, and then froze down to the ground, and so far as I have been able to find out, experiments with southern trees in the North have been practically a waste of time and money. So it is necessary to bear in mind that these northern varieties must be grafted or budded on trees grown from northern seed.

The proper time for grafting in the Evansville latitude is the last week in March and the first week in April. The scions must be cut from thrifty growing trees and must be used immediately after they are cut. Experience has shown that scions kept in cold storage or stratified in sand for any length of time lose a very large part of their vitality, and success with them is very limited in that section. Last year I cut most of my scions in November and December, stratified them in sand until spring, and my percentage of success with them was very small, while on the other hand Mr. McCoy used scions directly off the tree and had a satisfactory stand. I am of the opinion that it will be proven later that the best method of grafting in the North is to graft above the ground

and tie paper bags over the scions for two or three weeks until they start into growth. Our experiments so far have been confined to root-grafting, and while it has proven fairly successful under proper conditions, yet I believe that grafting above the ground will prove more successful. We have not done much budding in our section, but what we have done gives fair promise of success, and it may be that this will prove to be the best method of propagating nut trees in the North. In grafting we use both one and two-year-old wood, but one-year-old wood, if it is thrifty, is more desirable, although it is better to use thrifty two-year-old wood than to use weak scions of one year's growth. Either one or two-year-old growth can be used successfully.

My experiments and adventures in the work of propagating pecan trees were made for the purpose of securing enough of the desirable varieties of these trees to put out an orchard for myself. I found, upon inquiry, that it was impossible to buy hardy northern trees, and furthermore that but few of the desirable varieties had been propagated. In fact, I knew that some of the best ones had never been brought to the attention of the nurserymen, and being more anxious to risk my own judgment on this than that of anyone else, I started in to produce my own trees. Up to date I have accumulated a vast amount of experience and have a few trees to show for my work, but I would not take many times the cost and trouble of my work, for the information I have acquired. I have also sent to some of my friends bud-wood from our best trees for the purpose of getting these varieties propagated for the benefit of those who desire to grow them. My suggestion is that unless one is looking for the experience and enjoys a great deal of hard work and some expense, he had better buy his trees from some reliable person who has successfully propagated them.

If the farmers in the latitude of the good varieties of pecans were to put out ten to twenty acres on some corner of their farm and cultivate the trees properly, they would soon be surprised to find that this small piece of ground would be worth more money than all the rest of their farm, and they would leave not only a valuable estate to their children, but also a monument by which they would be remembered for more than a hundred years after they had passed from the toils of this earth. Ten acres of pecan trees can be cultivated at less expense annually than ten acres of corn, and if the grove consists of the right varieties and has been properly cultivated, it will be worth not less than $500 per acre in ten years. In fact, I do not know of a single grove of pecan trees in the United States—and I have seen many—of the right varieties that has been properly cultivated that can be bought for $500 per acre at ten years of age, yet the principal reason that this very thing has not been done by the farmers throughout the pecan belt is because they have not

had sufficient information on the subject and have had no means of acquiring it.

I do not want to close this long paper without saying something about walnuts and hickory nuts in Indiana. While it is true that the pecan is unquestionably the most attractive and valuable nut that grows in the world, yet there is much profit and satisfaction in the culture of walnuts and hickories. In southern Indiana we have some very fine varieties of the shagbark, and I am making some experiments in propagating it. One of the advantages of this nut is that it will grow far into the north. In fact, I have had some specimens of very beautiful shagbarks sent me by Dr. D. S. Sager, from Ontario, Canada. The shagbark is a slower growing tree than the pecan, but when properly cultivated shows a very satisfactory growth.

I am also experimenting with the propagation of the Persian (English) walnut, and so far have had very satisfactory results. I am trying some of the California varieties—the "Franquette" and "Parisienne" especially—and last spring I grafted a number of them on the wild seedling black walnut and they grew as much as four feet in height during the summer. There are several very fine varieties of the Persian walnut that are hardy throughout our latitude, and when grafted on the native black walnut stocks, make very satisfactory growth. I have had several Persian walnut trees under observation in Washington, close to where I live, and have found that some of these trees bear good crops of very fine walnuts. I cannot make this paper long enough to go into the details of this subject as it has been discussed here by others who know more about it than I. I merely desire to mention the fact that so far as our experiments have gone in Indiana up to date with the Persian walnut, everything seems to indicate that it can be very successfully propagated and grown there, provided the right varieties are selected; but with this, as with all other nut trees, the prospective orchardist must make very careful selection of the varieties which he plants.

In closing, I want to add just a few words more as to the value and beauty of nut trees. It is very hard to overstate either if the trees are properly cared for. A friend of mine recently asked me how early a pecan tree would bear, and how big it would grow within a certain time. I told him that it depended altogether upon who owned the tree. Nothing adds so much to the value of a home or to a farm as beautiful trees, and nothing indicates more the intelligence and taste of the person who owns a home or farm than the character of the trees surrounding it. In taking a trip through the country, it is very painful to notice how little attention has been given to trees, and I take it that this is due to the lack of information on this subject. A house can be built in a very short time. It can be furnished beautifully if one has taste and money.

The science of mechanics can do much toward making an attractive place in which to dwell, but after all, the home that is remembered and admired, both by its occupants and by others, is the home surrounded by beautiful trees that bring forth their leaves and blossoms and fruit to please the eye and the taste and temper the heat of summer. These cannot be bought with mere money nor made in a day, but when placed there with care and intelligence come forth with surprising rapidity and beauty and not only add manifold value to the home and farm, but bespeak for some one a standard of intelligence and nobility that is better than great riches; for he who plants and cares for a tree is of the true, the beautiful and the good.

President Morris: The paper is now open for discussion.

Professor Lake: I'd like to ask Mr. Littlepage a question. What is the condition of the wood of those large growths of walnuts?

Mr. Littlepage: When I observed it in November, it was ripening off very nicely. The average frost period for that latitude is about the twentieth of October, and we had had quite a number of very hard frosts,—in fact, there had been some ice. It had not been injured.

Professor Lake: That is remarkable.

Mr. Littlepage: I have pictures here of those, taken the twentieth of June. There was perhaps three feet of growth at that time. They quit growing about the middle of August down there, and to that I attribute very largely the fact that the wood ripened up.

Professor Craig: What is your minimum temperature?

Mr. Littlepage: I have seen the thermometer ten degrees below zero. I have seen the Ohio River frozen over so thick that for a month at Rockport the wagons could go across the river on ice. In fact, a threshing machine was hauled over. I don't know how low the thermometer got. I imagine it went lower than ten degrees.

President Morris: I have seen it lower still on Persian walnuts and pecans. It is the early starting of sap in spring that hurts mine most.

Mr. Littlepage: The pecans differ from native hickory. The native hickories in that section opened their buds and began to show strong flow of sap long before the pecans gave any indication whatever. Some of the pecans there seem to be very slow about starting sap. Very few pollinate before the tenth of May.

President Morris: My trees had to stand twenty-eight degrees one night only, but they have had to stand twenty sometimes, and frequently several degrees below.

Mr. Pomeroy: I want to ask if he thinks he will have any difficulty in transplanting those black walnuts seven or eight years old?

Mr. Littlepage: That suggests a very painful subject. I have had

that very thing in mind. They stand six or seven feet apart. I have got to settle that very question some of these times.

Mr. Pomeroy: I might suggest that you begin the fall before, and take a whole lot of time in digging around the trees, then leave them till nearly spring, then finish the transplanting before the ground has a chance to thaw entirely.

President Morris: I believe that is a good point, if you will do your cutting early, and let the callus form well during the winter. Let us hear more about that particular point.

Mr. Reed: In view of the fact that this Association is trying to rectify as many mistakes as it can, and the fact that it is looked upon as an establisher of precedents, I make the motion that all of our references to the nut just under discussion be to it as the Persian walnut, and not as the English walnut.

Mr. Pomeroy: I second that motion. (Carried.)

President Morris: Let us hear from Mr. Roper.

Mr. Roper: I don't think I know much about the Indiana pecan trees, except what we have been doing in Virginia with them. I have discussed some of the results in the paper on pecan trees for planting in the North.

President Morris: Committee appointments are as follows: Committee on Competition, Messrs. Reed, Littlepage, and myself, *ex-officio*. Committee on General Exhibits, Messrs. Barron and Roper. Committee on Resolutions, Messrs. Reed, Littlepage, and Schempp. Committee on Membership, Messrs. Deming, Lake, and Rush. Nominating Committee, Professor Craig and Col. Van Duzee.

Professor Lake: Does that complete all the committees?

President Morris: That is all on the list here.

Professor Lake: I would like to suggest one, because I think it will materially help the matter of bringing the nut subject before the people in an effective manner,—a committee on score card. That is at the basis of competitions, and when the nut grower gets acquainted with the score card, and knows that is going to be the basis of judging the competitions, he knows there is going to be something doing.

President Morris: That is a rather important point. I would like to have the matter discussed.

Professor Craig: I think the idea is an excellent one. There is no way in which we can analyze the qualities of fruit better than by having a systematic method of discussing its different characters. The score card does that,—separates each one and makes them stand for what they are worth. In order to unify methods of judging used by the different societies, a score card which this society might develop and recom-

mend would be a very valuable thing as a guide for nut growers here in the Northeast. The National Nut Growers' Association has a score card for pecans, and a score card has been recommended by the Department of Agriculture. I am not sure that score cards have been provided for the Persian walnut and for the hickories, and our northern types. I think Mr. Lake's suggestion is entirely in order and well worthy of consideration.

President Morris: It appeals to me at once. I think we would put Mr. Lake and Professor Craig on a score card committee.

Professor Craig: I think a score card can be presented, subject to revision, which will answer the present demand.

FRIDAY MORNING, DECEMBER 15, 1911.

President Morris: The meeting is called to order. The Secretary will read the proposed amendments to the constitution. I believe there is no provision in the by-laws for making such amendment. I don't know what the customary rule is in the matter. I presume we could submit it to a vote.

Doctor Deming: Under the heading "Committees," the following is proposed: "The Association shall appoint standing committees of three members each to consider and report on the following topics at each annual meeting: first, on promising seedlings; second, on nomenclature; third, on hybrids; fourth, on membership; fifth, on press and publication."

Professor Craig: I move the adoption of this amendment to our constitution. (Seconded. Carried.)

Doctor Deming: Under the head of "Meetings," the amendment is as follows: "The Association shall hold an annual meeting, to be held at the time and place to be selected by the Executive Committee."

Professor Lake: Some way or another, I feel that I oppose that attitude. I believe a delegate will often go to a convention with the idea of presenting views upon holding it at some specific place. It seems to me we ought to give the annual meeting an opportunity to designate the place of meeting. Some people say they will pack a convention. If they are sufficiently enthusiastic to pack a convention they are entitled to have the meeting. I have heard an expression from one or two members that they would like to see it at a certain place. It is true they can present their views to the Executive Committee, but if the Executive Committee is not present at this place, it is necessary for them to make another trip, or appeal to them by correspondence. I would like to have that put in such a way that the annual meeting might select the place of meeting.

President Morris: It is a matter for consideration. Is there any further discussion on this point?

Doctor Deming: It seems to me that the question of the selection of the meeting place is a matter for very deliberate consideration, and it isn't always that a question of this kind will get deliberate consideration in a meeting which acts very often without considering all sides of the question. It seems to me that, while it would be advisable to have the place of the next meeting discussed by the Association as a whole, the decision as to the place of meeting might very safely be left to the Executive Committee.

Mr. Littlepage: I think, as a general rule, it is pretty wise to give some latitude in these matters, for the reason that conditions may develop from time to time which make it desirabile to have some flexibility as to the place of meeting. I think, especially with the able Executive Committee we now have, it could safely be left to the Executive Committee.

Professor Craig: Since Professor Lake has spoken, I have a good deal of sympathy with his attitude, and I am rather inclined to think it would be wise to modify that clause in such a way as to give the meeting the privilege, in case there was an overwhelming element in favor of a certain place, of selecting the next place for the convention; and I would suggest a modification of that clause to this effect, that the place of meeting shall be selected at the annual meeting, or by the Executive Committee subsequently thereto. That would give the membership an opportunity of having a word in it, and would open the door so that it could be considered at the annual meeting; but in the event of this not taking place then, it would fall to the Executive Committee to select the meeting place. I move that as an amendment to the proposed clause.

Professor Lake: I support Professor Craig's motion.

Professor Craig: If my seconder will approve, I will offer that as a substitute instead of an amendment.

Professor Lake: I accept it. (Carried.)

Doctor Deming: Under the head of "Officers," the following amendment is proposed: "There shall be a president, a vice-president, a secretary-treasurer, and an executive committee of five persons, of which latter the president, vice-president, and secretary shall be members, and a vice-president from each state represented in the membership of the Association."

Professor Lake: I move that the clause be accepted.

Mr. Rush: I second the motion. (Carried.)

Doctor Deming: Under the heading of "Election of Officers," this addition is proposed: "The President shall appoint a nominating com-

mittee of three persons at the annual meeting, whose duty it shall be to report to the meeting a list of officers for the ensuing year."

Professor Lake: I don't want to be an objector. I simply want to file a protest against this method of election in an organization, on general principles. I am opposed to anything that looks like continuing an administration. This doesn't give an opportunity for election from the floor. It might be so amended, that an annual meeting may elect from the floor. I am thoroughly in sympathy with popular government. I have seen a good deal of this, and I would like to get away from the sentiment of anything of that kind by allowing nominations from the floor.

Doctor Deming: How would it be if the nominating committee, instead of being appointed by the President, were appointed in some elective way by the meeting as a whole?

Professor Lake: I accept Doctor Deming's suggestion. That is a most excellent way of eliminating both sides of the controversy. I would like to put that definitely into form, that we have a committee of five,—that is sufficient for the present,—that a committee of five be elected at the annual meeting for the purpose of nominating officers for the subsequent year. I put that as a motion.

Mr. Rush: I second that motion. (Carried.)

President Morris: The committee for the nomination of new officers will consist of Professor Craig and Colonel Van Duzee. This other committee of five, as I understand it, is not to be appointed now.

Doctor Deming: The only thing that I have now is the proposition that we honor Mr. Henry Hales by electing him an honorary member of the Association. I would like to move that Mr. Henry Hales of Ridgewood, New Jersey, be elected an honorary member of this Association.

Mr. Littlepage: I second that motion. (Carried.)

President Morris: On the competition, the committee consisted of Mr. Reed, Mr. Littlepage, and myself. Mr. Littlepage has specimens in for competition, and I will appoint Mr. Roper in his place. The next order of business will be the paper on experiences in propagation, by Professor Close.

THE BENCH ROOT-GRAFTING OF PERSIAN WALNUTS AND PECANS.

By C. P. Close, U. S. Dept. of Agriculture, Washington, D. C.

The results of my bench root-grafting of Persian walnuts and pecans at the Maryland Agricultural Experiment Station in 1911 were not as satisfactory as might be wished, partly owing, at least, to the unusually long and hot drought which was disastrous in many respects in this section of the country.

PURPOSE AND METHOD OF THE EXPERIMENT.

The purpose of this experimental work was to devise some method of procedure in the bench grafting of nut trees which would be reliable and practical, especially if done during January, February, and March. The whip or tongue method with variation in thinness of tongue to make closely fitting unions, was employed. For the Persian walnut cions, black walnut, butternut and Persian walnut roots were used, and for the pecan cions, hardy Indiana and ordinary southern pecan seedlings, whole root and piece root, were used. Part of the grafts were planted outdoors in nursery rows as soon as made and part were placed in soil or decayed sawdust in a cool greenhouse. This was for the purpose of determining whether or not it would prove advantageous to go to the extra expense and trouble of placing the grafts under greenhouse conditions until April or May. Ground beds were used and thus bottom heat was not applied.

PERSIAN WALNUTS.

There were 287 grafts of San Jose, Concord and Franquette Persian walnuts, made from February 15 to April 4, which were planted in nursery rows very soon after being made. Only 40 of these were alive in October, the best results being obtained with San Jose on black walnut stocks. Sixty-four walnut grafts were placed in decayed sawdust in the greenhouse in February and March and of these 22 were alive early in May when they were taken out.

PECANS.

The pecan grafts, set in nursery rows as soon as made, numbered 474 and consisted of the following varieties: Mantura, Appomattox, Frotscher, Moneymaker, Van Deman, Stuart, and Pabst. Only one of these, a Pabst on a piece root, lived during the season.

The grafts which were placed in the greenhouse gave pretty good results as shown by the following data given respectively under the headings "Earth Bed" and "Decayed Sawdust."

EARTH BED.

Jan. 14.	10	Moneymaker on Indiana stocks, not waxed.	8 alive in May.
	10	Moneymaker on Indiana stocks, waxed	4 alive in May.
Feb. 14.	10	Mantura on Indiana stocks, not waxed.	8 alive in May.
	15	Moneymaker on Indiana stocks, not waxed.	11 alive in May.
Mar. 8.	33	Stuart on Indiana stocks, not waxed.	20 alive in May.
	30	Stuart on Indiana piece roots, not waxed.	15 alive in May.
Totals	108		66

DECAYED SAWDUST.

Feb. 14.	25	Mantura on Indiana stocks, not waxed.	6 alive in May.
Mar. 8.	12	Stuart on Indiana stocks, not waxed.	12 alive in May.
	23	Stuart on Indiana stocks, not waxed.	21 alive in May.
Totals	60		39

These figures show that 61 per cent of those in the earth bed and 65 per cent of those in the decayed sawdust, were alive when they were taken up early in May. Some had made a growth of from two to eight inches and were fine little trees. Most of these transplanted grafts were set in nursery rows and nearly all succumbed to the extreme drought of the season.

CONCLUSIONS.

The season was so extremely dry that the practice of planting root grafts as soon as made did not prove successful. However, work done in other years indicated that in normal seasons this may be done with considerable success. Placing the grafts in a greenhouse either in earth or decayed sawdust gave encouraging results, but when transplanted in the nursery the grafts could not withstand the unusually dry and hot weather. The black walnut proved to be the best stock for the Persian walnut and two buds to the cion are required. Grafting wax should not be used if the union of cion and stock is to be covered with earth; this point was clearly proven in previous years.

[The foregoing paper, read by title, was the subject of a verbal report by Prof. Lake, who said further:]

Prof. Close performed considerable work in topgrafting and budding on three and four year old stocks. The top grafts were a failure. The buds survived, and were in good, strong condition October fifteenth. That was on Persian walnut and pecan, about half and half.

Mr. Pomeroy: Did he bud on black walnut stock?

Professor Lake: Yes. It was a little higher than a man, and had been cut back to about three feet. The crown grafting was fairly successful, but would have been much more successful, had they used something to cover the grafts.

Mr. Pomeroy: How long should the paper sack be left?

Professor Lake: It would vary with the season and activity of the stock, ten days to two weeks.

President Morris: I wish you would try further experiments in rooting scions in warm sand in the hot-house. I believe that in some stage you can probably root those cuttings in moist sand in the hot-house, heated beneath; and if you can do that, it is going to settle the question very largely of hickory and walnut propagation. What do you think about that, Professor Craig?

Professor Craig: I am not very optimistic about the possibility of that. I find it very, very difficult to get roots to develop from *Hicoria*. You can get the callus almost every time, but it is very difficult to secure the development of roots afterwards.

President Morris: How about getting callus by three months, we will say, in storage?

Professor Craig: We would have the same trouble. They would develop adventitious buds very poorly. Doctor Morris has sent us from time to time some samples, and we have been making experiments. I have used different methods and different propagators. We have one propagator, who has been most successful usually in striking difficult things, and he has absolutely failed in this one. I may say that our facilities for propagation are not ideal at the present time, but we shall have in a short time a good propagating house with properly regulated benches, as to bottom heat and overhead ventilation and all that; and we shall, of course, keep up the experiments.

President Morris: In my experiments, I grafted hickory scions on hickory roots, and the whole thing, root and scion, lived until the root sent out adventitious buds, yet in that case we did not get union between the top and the stock. How do you explain that, Professor Craig?

Professor Craig: I don't explain it.

President Morris: Are we likely to have success along that line by some modification of the plan?

Professor Craig: I couldn't say. You can keep the cuttings alive for three or four months.

President Morris: They were in damp rooms, exposed to light, right in the window.

Doctor Deming: Professor Coville has made some experiments in rooting hickory cuttings for me. Professor Coville is the one who has

made such a success of blueberry culture. I sent him some cuttings, and he reports as follows:

"Two experiments were tried with the hickory cuttings received from Dr. W. C. Deming on January 5, 1911. In one experiment some of the cuttings were placed in a glass cutting bed in live sphagnum covered with sand, the upper ends of the cuttings projecting from the sand. The atmosphere above the cutting bed was kept in a state of saturation by a covering of glass. The bed was kept shaded and was subjected to an ordinary living room temperature varying from about 55° to 70°, or occasionally a few degrees higher.

On January 11 the cambium ring at the lower end of the cuttings had begun to callus. On February 17 the upper bud on one of the cuttings began to push. Later some of the other cuttings began to swell preparatory to the development of new growth. All the cuttings, however, finally died. It appeared from their behavior that the temperatures to which they were subjected were too high for their best development.

In the other experiment the cuttings were placed in sand without sphagnum in a greenhouse at a temperature ordinarily of 50° to 65°, rising occasionally, however, on still, sunny days to 70°. After a few weeks, these cuttings were well callused and the buds began to swell slowly, exposing first their green bracts, and later on some of the cuttings the green compound leaves, pushing out from among the bracts. These cuttings also, however, finally turned black and died, but not until after the first of April.

The experiments showed that hickory cuttings, when taken at a suitable time of year and exposed to conditions suited to other hard wooded plants known to be difficult to root, retained their vitality and passed satisfactorily through the stages preliminary to rooting. While no actual roots were secured, the experiments suggest that the rooting of hickory cuttings is not beyond the possibility of attainment.

As the basis of an experiment this winter, I suggest that you select half a dozen twigs that you are willing to sacrifice on some good variety of hickory, and remove a ring of bark at a distance of 4 to 8 inches from the top. The ring of bark removed should be about half an inch in length and its upper end should come about a quarter of an inch below a bud. At the present season the bark will not peel from the wood. It will, therefore, be necessary to scrape it off, so as to leave nothing but the wood on the girdled area. The bark should be cleanly cut at each end of this area. I hope that we shall still have sufficient warm weather to induce the formation of a callus on the cambium at the upper end of this ring.

Later in the winter, some time in January, you can cut off these

twigs and send them to me, packed as those were last year. The cutting is preferably made just below the ring. I would prefer that all the wood from the ring to the tip of the twig be of the past summer's growth. We can try, however, twigs containing two seasons' growth, if the others are not easily available."

President Morris: That is a suggestion, you see, of apparent value, because it has succeeded with blueberries,—this method of cutting off a ring of bark before the leaves are shed, allowing a ring to callous, then later cutting off this prepared twig and subjecting it to methods for striking roots. It is an extremely interesting suggestion. Just as soon as I heard of this procedure, I went out and prepared about fifty hickory and walnut twigs myself, but that was this autumn, and I haven't cut them yet for the experiments in rooting. Has anyone had experience along this line?

Mr. Collins: I saw an experiment in rooting, and I am prompted to ask if anything has been done along this particular line. The method employed was this. The twig was partially cut from the branch, perhaps cut three-quarters of the way through with a slanting cut. It was then bent a little, and a little sphagnum put in the cut, then a ball of sphagnum was wrapped about the whole cut area, and it was tied with twine, and that was kept wet for several months, I think, until, finally, new roots pushed through and appeared on the outside of this ball of sphagnum.

President Morris: I read of that. It was published in a government report.

Professor Collins: It was on the rubber plant.

President Morris: I tried it at that time on the hickory. The difficulty was in getting my men sufficiently interested to keep the sphagnum wet all the time. It promised something. The rubber plants, perhaps, would lend themselves more readily to such a procedure than the hickories, because most of the rubber plants are air plants, anyway. All of the *Ficus* family depend so little upon the ground for their nourishment.

Professor Collins: I have seen that worked very successfully.

Professor Lake: You don't know how successful the callousing has been?

President Morris: They calloused all right.

Professor Lake: How long did it require?

President Morris: I don't remember. It was a good while, longer than I anticipated. I don't think there was a callus on the hickory in less than thirty days. The butternut and black walnut hardly showed any callus at all after keeping the sphagnum wet as long as my men would do it.

Professor Lake: At what time was the ringing done?

President Morris: The leaves had fallen this year. Professor Coville suggested that it be done before the leaves had fallen. But the hickory will callous after the leaves have fallen. It seems to me hickories are at work all winter long. They have a free flow of sap in January, and any warm day in January they will be like a maple tree, almost, if they are cut. I have grafted them at that time.

Mr. Brown: Can anyone give me any information on grafting chestnuts?

Mr. Rush: I have been very successful with the grafting of the chestnut. It is just as simple as grafting other fruit, except the Persian walnut. Tongue grafting and cleft grafting is very successful. There is no particular secret in connection with grafting chestnuts.

President Morris: Personally, I found it difficult for two or three years, but now I can graft the chestnut about as readily as I can graft the apple. There is no difference in methods. It seems to me from my present experience that one may graft or bud chestnut by almost any of the accepted methods pretty freely. What has been your experience, Mr. Littlepage?

Mr. Littlepage: I haven't been experimenting with the propagation of the chestnut yet. I am getting ready. I have three or four thousand seedlings, a few of which will be ready to graft next year. I have twenty acres of the Paragon chestnuts growing.

President Morris: In chestnut grafting, we will find that one kind does not graft or bud readily upon another kind, perhaps. For instance, there is some antagonism between the American sweet chestnut and Asiatic chestnuts. There is some antagonism between Asiatic and Europeans; there is little between Europeans and American sweet. These antagonisms are something that one has to learn from experience at the present time, because I doubt if we have had enough experience to know just where we stand on this question.

Professor Collins: Doesn't there seem to be antagonism between eastern Asiatic other than Japanese and Japanese?

President Morris: Yes; the Koreans of both kinds, the north Japanese of both kinds, and the Manchurian chestnut are the five that I have experimented with in grafting, and none of those grow so well on American stock as they should.

Professor Collins: I mean to say between the Korean and the Japanese.

President Morris: There is less antagonism. You can graft the Korean upon the Japanese and the Japanese upon the Korean very readily. They have very much the same texture of wood, the same character of buds and bark.

Professor Collins: Is there any antagonism between eastern Asian and Japanese?

President Morris: I don't know that my experience has been extensive enough to say. My men have put on perhaps two or three hundred grafts back and forth between these kinds, the customary accidents have happened, and we have about given up trying to do much grafting of Japanese on American, but still plan to graft Japanese back and forth upon each other, and we are now planning to graft European and American back and forth upon each other.

Mr. Brown: What about the position of the graft?

President Morris: I don't know, Mr. Brown, if there is very much difference. I haven't found very much. I have grafted all the way from the root to the top.

Mr. Rush: It is better on top. Sometimes the grafting has an effect upon the stock just at the union. If it is budded low, it blights. The bark gets loose. All those that are grafted high are doing remarkably well.

President Morris: The next on the list is Doctor Deming's paper on "Nut Promotions."

Doctor Deming: I will read first a communication from Mr. Henry Hales of Ridgewood, New Jersey.

HALES' PAPER SHELL HICKORY.

My shagbark (paper shell) hickory tree was on my farm when I bought it in 1868. It had been noticed by the neighbors as bearing a fine nut and was watched by them for the nuts, but they did not appreciate the value of them. The late Andrew S. Fuller had not seen them, but asked me to bring him a few. When he saw them he was surprised and at once pronounced them the finest hickories he had ever seen, and named them "Hales' Paper Shell." The hickory is one of the most valuable of North American nuts. It is of a variable nature. I have over twenty old trees on my place, and no two bear nuts of the same shape or size, and although some neighbors planted some nuts from the old tree and produced fruit from them they were only ordinary sized, so that it is necessary to propagate them to retain their value. About 1880 Parsons & Son, of Flushing, N. Y., grafted some in pots under glass, from which trees these nuts sent are the product. The fruit is fully as fine as the original tree. Prof. C. B. Sargent of the Arnold Arboretum has taken great interest in the nut. I have two trees grafted on wild saplings by Jackson Dawson near bearing size.

Those are the only trees successfully grafted, out of thousands done

in the North outside, from which I am afraid grafting outside in the North is a failure on hickory stocks. There may be a better chance on pecan stock, which I have not thoroughly tested under favorable circumstances. I have been sending northern pecan nuts and had them planted, and sent scions for working on them in the South; had some failures from natural causes. Simpson Bros. of Monticello, Florida, have had fair success there. My share of two year old trees are on the way here. Of the value of these nuts too much cannot be said. Mr. Fuller ranked them superior to the Madeira nut. It has remarkable keeping qualities.

It has taken from eighteen to twenty-five years for my grafted trees to come into bearing.

I earnestly hope that with the knowledge gained so far, the means of propagation on a large scale will soon be discovered and successfully carried on. What a gain it would be to the wealth of our food production and luxury. The American hickory would then stand highest on the list of our native nuts.

President Morris: Are there any comments upon this paper of Mr. Hales? So much is being said about the Hales hickory, it seems to me that possibly we ought to put on record some thoughts in the matter. Mr. Hales is entitled to more credit than any other man for bringing forward the development of the shagbark hickory, and his enthusiasm was based upon this remarkable nut on his grounds. It is a very large nut, and, like all large nuts, is much coarser in character than small nuts, and, like all large nuts, lacks delicacy of flavor that we find in small nuts. It is thinner shelled than most of the shagbarks that we would see in many days spent in the woods, but when we have for comparison some smaller nuts, we find shells very much thinner than the shell of the Hales. The Hales, like many other large hickories, keeps much better than the small hickories of finer texture and more delicate quality, and it may be very good at three years of age, while some of the most delicious of the smaller, more tender and delicate nuts are spoiling at the end of six months. I don't know that Mr. Hales would take exception to my way of stating this, but it seems to me that he ought to feel that we give him all honor, that we think it a remarkable nut, that it is a nut, because of its size and features, worthy of the enthusiasm he gave it. There is apt to be some misunderstanding as to the exact position this holds in relation to other shagbark hickories.

Mr. Littlepage: What is its bearing record as to quantity?

President Morris: The tree has been cut so much for scions that it has never had a fair chance. It is a prolific tree. It is well worthy of propagation.

Mr. Littlepage: It is, perhaps,—judging from looking at it—a very fine shagbark for commercial purposes. Isn't it true that within the next ten years there will, in all probability, be a complete reversion in the mind of the nut culturist as to the kind and quality of the nut he will propagate. I will supplement that by saying that heretofore, both in the pecan and other nut fields, the whole tendency has been toward something big. Now, the wise fellows in the South today are beginning to get away from that. I have made many trips down there, and I find there is a very changing sentiment. I want to say that in my observation the future price of the various nuts of the country is going to be determined by the price of nut meat; that the meats are going to be put on the market, and while there will always be plenty of nuts marketed in the shell, the price of the nut meat will be the dominant factor. I was walking down G Street in Washington the other day with an ex-United States Senator, and ex-member of Congress, and an ex-Governor, and they passed a nut store, and saw in the window some nuts, also a big box of nut meats. Everyone went in, and all passed up the nuts and bought the nut meat. That expresses, to my notion, the tendency that is coming; and that thing is going, then, to determine very largely the question of quality.

President Morris: I think we certainly are going to have a complete change in ideas about raising nuts. We are going to raise big ones of the kinds where everybody will buy one pound and nobody will buy two pounds. We are going to raise nuts that will appeal to the people who purchase things in the open market, and who never in their lives get hold of anything that is good. We are going also to raise nuts that will appeal to connoisseurs, and that will be bought by people who know one work of art from another. In other words, we are going to make the progress in nut culture that has been made in other fields of horticulture. At the present time, if one could raise a pear as big as a watermelon and tasting like the rind, that would be the pear that would sell in the market. But the connoisseur buys the Seckel in place of it. When there is a pear like the Kieffer that will fill the top of the tree so there is no room for leaves and branches, the market men are going to raise that pear. But when we go into the market, we go around a block to escape the place where they sell the Kieffer pear, and we buy the Bartlett. We have precisely the same problems in nut culture.

Mr. Pomeroy: I have been thinking some on this line. I have spent a good many half hours in the last four or five years with an old German in Buffalo. He has a stand on one of the big markets. I find that he has a whole lot to say in regard to what the people buy. He has found this out, and he has been there a good many years. He says, "I

have been getting black walnuts from the same farmer boy for six or seven years. They are fine; try one." He has learned something about the different trees throughout that section, and about some nuts that are being shipped in, and he can tell the varieties. He has customers that do come back after the second package of nuts. He is trying to keep those customers one year after another. He is creating the demand. When I was a youngster, if I could have received the prices for black walnuts and butternuts that youngsters get now, I would have thought I was a capitalist. Butternuts are retailing at two dollars and two dollars and a half, and black walnuts the same.

President Morris: We have got to get away from the idea that we are going to find the best hickory nut or the best walnut or the best nut of any kind in the largest nut. Nature spreads out just so much material in the way of flavor and good quality of a nut, and if it is in a large nut, those good qualities are spread out thin; if it is in a small nut, they are concentrated.

Professor Lake: I wish I were as optimistic as Mr. Littlepage in this matter. That is because he has been studying all nuts for twenty-five or thirty years, and I have only been dabbling around in Persian walnuts for about twenty years. I have been dabbling with apples twenty-five or more years, and the real connoisseurs of the apple have been telling us during that time that the Ben Davis would be wiped out inside of ten years. I heard that twenty years ago. I believe that there are more Ben Davis apples being consumed by the public today than any other one apple. Notwithstanding that, every man who knows good apples goes out and decries it. It is because that apple can be grown anywhere by anybody at any time, and will be eaten by the people. The kind of nut that is going to make the money the next twenty-five or thirty years is the nut that is prolific, of fair quality, that can be grown by any man, and that has a fairly good appearance. I believe that the process of educating the public on the matter of quality is going to be tremendously slow. It is not always the case, however, that the smaller the size, the better the quality. A medium size would be better. The Yellow Newtown is quite a large apple, and it is superior in quality to the Winesap.

President Morris: I was stating a general rule.

Professor Lake: I fear we aren't going to be able to educate the people. How many people who eat nuts know anything about their quality? Dr. Morris has got the ideal of the best nut in walnuts, for instance, the French Mayette. That is the connoisseur's choice. I know of many people who will tell you very frankly they prefer the American grown Franquette, which is much more starchy in make-up and much less nutty.

Mr. Littlepage: I think there is a great deal in what Professor Lake says. I am not sure he has got the cause of the facts he states. One reason why the Ben Davis is being planted is, as he stated, that it will grow almost anywhere; but the reason the public accept the Ben Davis is because they can't get enough of another at a reasonable price. There isn't any doubt that if there were plenty others at a reasonable price the Ben Davis wouldn't be used at all. We hear so much today about this high cost of living. Of course, there are artificial conditions that have contributed to this to a greater or less extent; but the principal element is that we have come up against the problem of feeding the great American public, that has grown faster than the facilities have grown. The time for low priced food products is gone forever. Yet there is a good deal in this commercial phase of it.

President Morris: The Hales hickory is going to be like the Ben Davis apple, one of the very most popular in the market.

Doctor Deming: I will say regarding the retail price of nuts that in New York City shelled filberts are priced at $1.25 a pound, shelled almonds $1.00, ordinary run of hickories and chestnuts in the shells twenty cents, black walnuts in the shell twelve cents.

President Morris: Hickories will give somewhat over fifty pounds to the bushel; black walnuts about forty. If we make a rough estimate of fifty pounds to the bushel for shagbarks, and forty for Persian walnuts, we will probably have a good fair average.

NUT PROMOTIONS.

By W. C. Deming, New York.

Promoters attack their quarry with a two-edged sword; one edge is what they say, the other what they leave unsaid; and both edges are often keen. What they say generally has a foundation of truth with a superstructure of gilded staff. You must knock over the staff and examine the foundations to see if they are laid up in good cement mortar or only mud. Sometimes they are honestly laid but your true promoter can no more help putting on his Coney Island palace of dreams than a yellow journal reporter can help making a good story of the most everyday assignment. I suppose he takes a professional pride in his decorations, even when the real facts themselves are good enough. Or even, in his enthusiasm, half believes, and fully hopes, that what he says is true. So you never can say that because of the evident gilding there is nothing worth while beneath.

What the promoter does not say it is absolutely necessary for the safe investor to find out. Deductions from experience in general, and

from knowledge of the business in particular, will help and, when these favor further investigation, there are two essentials for a wise decision. First, a study of the records of the promoters, and second, a personal examination of the property. If these can be thoroughly made, and the results are satisfactory after a suitable period of mental incubation, if the prospects will stand the candle test for fertility, you may put some money on the chance of a good hatch; remembering, too, that many a good hatch afterward comes to grief with the pip.

Some promotions are conceived in iniquity, some in drunkenness and folly and some are abortive from incapacity. Your legitimate and well-born, well-brought-up promotion, fathered by ability and mothered by honesty, it is your problem to recognize, if that is what you are looking for, and to avoid the low-born trickster or incapable. No one can tell you how to do this any more than he can tell you an easy way to graft hickories.

The northern nut grower is not yet bothered with northern nut promotions. At most he is called on to discount the statements of sellers of trees, and that a little, not too expensive, experience will teach him. The West is apparently too busy selling fruit and fruit lands to lay out nuts to trap eastern nibblers. But the allurements of pecan growing in the South are spread before us with our bread and butter and morning coffee. The orange and pomelo properties have been banished from the stage, or made to play second fiddle, and now we see in the limelight the pecan plantation, with a vista of provision for old age and insurance for our children. And there shall be no work nor care nor trouble about it at all. Only something down and about ten dollars a month for ninety-six months. And the intercropping is to more than pay for that. It is indeed an enticing presentation.

Although we have as yet no northern nut promotions we may expect the time when the sandy barrens of the shore and the boulder pastures of the rock ribbed hills will be cut up into five acre plots and promoted as the natural home of the chestnut and the hickory, holding potential fortunes for their developers. I hope it will be so for it will postulate a foundation in fact. But the chestnut blight and the unresponsiveness of the hickory to propagation as yet hold up these future camp followers of the northern nut growing pioneers. So that for the present there is only the sword of the southern pecan promoter to parry.

It would be a work of supererogation and effrontery for me to attempt to treat this subject in particular since it has been so clearly and ably done by Col. C. A. Van Duzee of St. Paul, Minn., and Viking, Fla., from the standpoint of long experience and full knowledge. His paper should be read by all interested persons. I am permitted to make the following quotations from it:

"The pecan as an orchard tree has recently been discovered and its history has not been written. The record at present is largely based on scattered individual trees growing under abnormal conditions which, as a rule, are favorable. . . .

"Calculations and deductions based upon these results have been made which are fascinating, but they are utterly unreliable when applied to orchards of other trees in different localities growing under totally different conditions? . . .

"No one knows what a pecan orchard grown under such conditions is going to do."

Col. Van Duzee, however, expresses firm belief in the success of pecan growing under proper personal supervision.

It all comes down to the question, "Can you or I hire our business done for us, never go near it ourselves and expect others to make a success of it for us?"

And yet, when all is said, I confess that I have been tempted by my faith in the present and future of pecan growing in the South. I might have invested were it not for my firm belief that, in nut growing, the North is but a few years behind the South, and that I wish to devote my resources and my energies to having a hand in a development which, I share with you the belief, is to be of inestimable benefit to the human race. We can picture the day when our dooryards, our roadsides, our fields and hills shall be shaded by grand nut trees, showering sustenance and wealth on our descendants, and all people, and bearing the names of their originators; when the housewife of the future shall send her wireless call to the grocer for a kilo of Hales' Papershells, the Rush, the Jones, the Pomeroy Persian walnuts, the Black Ben Deming butternut, the Craig Corean chestnut, the Morris Hybrid hickory, the Close blackwalnut or the Littlepage pecan.

President Morris: It is a very timely paper. The number of promoters we find in connection with any subject furnishes an index of the fundamental value of the original proposition. The number of dishonest people, the number of fakirs that are now promoting development schemes in connection with the pecan indicates that down at the bottom somewhere, there is a real gold mine. We will go on to Mr. Roper's paper.

SOME FACTS CONCERNING PECAN TREES FOR PLANTING IN THE NORTH.

W. N. Roper, Petersburg, Va.

Pecan trees for successful culture in the North must be of hardy, early-maturing varieties, budded on stocks from northern pecans and grown in nursery under suitable climatic conditions. These are requisites indicated by practical, experimental work and observations extending over several years.

The successful production of large southern pecans in far northern climates can hardly be looked for except under the most favorable conditions of soil, location and season. There seems no good reason for planting southern pecans in the far North, except in an experimental way; for there are northern varieties now being propagated that are the equal of most of the standard southern sorts in quality and very little below them in size. They will prove to be as large or larger in the North than the southern varieties grown in the same locality, and much more apt to bear regularly.

The method used in propagating the hardy types is important. Budding and root-grafting each has its advocates among pecan growers in the South, and this would indicate that there is no great difference between the trees propagated by these two methods when they are planted in that section. But based on results with several hundred specimens, root-grafted pecan trees are not desirable for planting in northern climates.

During the past six years there have been grown in nursery, in the eastern part of Virginia, near Petersburg, about 2,000 root-grafted trees of eight southern varieties of pecans and one Virginia variety, including Stuart, Van Deman, Moneymaker, and Mantura. All these trees are worthless. None of them, though they have been cared for, has ever been considered by the grower fit to dig and transplant. Most of these trees suffer winter injury each year, many of them being killed back to the graft union. Those that do not die below the ground grow out the following summer, only to be killed back again the next winter or spring. Those damaged only a part of the way down the trunks, even when not badly injured, do not recover promptly. Several hundred budded trees grown during the same period in adjoining rows have been entirely free from any winter injury. The grafts and buds were inserted on stocks from northern and southern nuts.

A thousand budded and root-grafted trees received from six southern nurserymen were planted in orchards in the same locality. A very large percentage of the root-grafted trees died; only a small percentage

of the budded trees died. Many of the root-grafted trees that survived are making poor growth; most of the budded trees are strong and vigorous. The only trees of the Virginia varieties ever reported winter-killed were root-grafts.

No root-grafts of the northern types on northern stocks have been made in Virginia, but root-grafts of Indiana varieties on southern stocks transplanted there winter-kill badly. Several Indiana trees root-grafted on southern stocks and in their second year's growth in the nursery winter-killed in Florida last season. Not a single budded Indiana tree in Virginia suffered any winter injury whatever, although the buds were grown on southern as well as on northern stocks. All the root-grafted Indiana trees transplanted at Petersburg during the past two years have died from winter injury.

Northern types root-grafted on northern stocks not having been tested, no definite information can be given, of course; but with all southern varieties winter-killing in the North, when root-grafted on either northern or southern stocks, and the Virginia variety winter-killing when root-grafted on southern or northern stocks, and the Indiana varieties winter-killing both in the North and in the South when root-grafted on southern stocks, it seems reasonable to presume that the northern varieties root-grafted on northern stocks will also winter-kill. The stocks of the root-grafted trees are seldom injured. They send up sprouts except in cases where the graft union is so far beneath the surface of the soil that after the grafted part is killed the stock is too deep to grow out.

Not a single tree out of a total of 40,000 seedlings in Virginia grown from northern nuts planted during a period of six years has ever been found affected by winter injury; practically all the trees out of 50,000 or more grown in the same locality from southern nuts, planted during the same years had their tops affected by winter injury the first, and most of them the second season of their growth; but no injury after the second season has been noted.

With the view of making southern varieties better adapted to planting in northern area, experiments have been made in propagating them on stocks from northern nuts. This stock has thus far proved unsatisfactory for southern varieties either budded or root grafted. The trees from northern nuts go dormant earlier in the fall and remain dormant later in the spring than trees from southern nuts. Northern trees in the nursery rows in early spring, in a perfectly dormant condition, are in striking contrast with the southern trees and their fresh, green foliage. Though the growing period in the North is nearly a fourth shorter for the northern than for the southern varieties, the native trees in the North make equal growth with the southern trees

there during the same season. Northern varieties budded on northern stocks grown at Petersburg the past summer made nearly as much growth during one season as root-grafted trees of the same varieties on southern stocks grown in Florida two seasons. The trees at Petersburg were from dormant buds set the previous fall. They were just starting into growth in May when the trees in Florida had made a growth of six to twelve inches.

The northern seedlings in the North make better growth in a season than the northern seedlings in the South, as far as has been observed. When the growing period begins in the northern climate, the native trees respond at once to the quick growing season and outgrow the trees that have been accustomed to a slower growing climate. When their growing period is over, they begin promptly their preparation for the winter. The long, slow growing climate of the South does not seem to give the quick growing tree of the North an opportunity for its greatest growth at the important period. There appears to be too much difference between the growing habits of the southern and the northern pecans for either to be suitable stock upon which to grow the other.

Two choice trees of Moneymaker and one of Stuart, all well grown and giving every promise of success, were selected out of a large number of these varieties budded on northern stocks, and were transplanted in orchard two years ago for experiment. The Moneymaker trees have made little growth and the Stuart tree practically none. All have an unhealthy appearance and are left standing only for further experiments.

The section of Virginia in which these experiments have been made affords very severe climatic tests. The temperature in winter sometimes goes below zero, the temperature in spring is variable, changing suddenly from warm to freezing. Pecan trees seem able to endure almost any degree of cold when they are in a thoroughly dormant condition. The winter-killing from which they often suffer in the South, as well as in the North, is due to the effect of sudden freezing temperatures following warm periods in winter or spring.

Only well grown, vigorous pecan trees should be planted in the North. It is a waste of time and money to plant indifferent pecan trees in any locality, and especially in a locality where they have to contend with severe climatic conditions. The size of the tree is less important than its root system and vigor. The purchasers of trees grown on thin, sandy soil, with the root systems consisting almost entirely of straight tap roots, destitute of laterals, need not expect success. Most of these trees will die early, and many of those that live

will linger on for several seasons without making much growth, tiring out the patience of the planter.

The work of transplanting should be very carefully done and the trees given proper care and culture.

It has been found that it costs more to grow pecan nursery trees in the North than in the South, but it is believed that planters in the North will find that these trees have a value which will far offset their additional cost.

Some of the methods of propagation and care are slightly different in the North from those that usually obtain in the South. But it is not practicable to go into the details connected with this work. The facts that have been mentioned are those that are believed to be of most importance for consideration by persons planting pecan trees in the North. Those who have gone thus far with the work upon which the conclusions are based are continuing as earnestly as they began.

The outlook for the success of the pecan industry in northern territory is exceedingly promising where hardy, early-maturing varieties are properly grown in nursery on hardy stocks under climatic conditions that will best fit them for the locality in which they are to be planted.

President Morris: We can give some time to the discussion of Mr. Roper's paper. I want to ask if some of the hardy kinds which will stand the winters well may not carry their ripening season so late that they do not properly mature? Isn't this a line of observation we have got to follow out in adapting pecans to northern fields? Who has had experience?

Mr. Littlepage: That is a very important point, and it is one of the things that everyone is going to discover who is engaged in northern pecan planting on the extreme limits within the next few years. There isn't much danger of the pecan getting frost-bitten in the spring as some imagine, because the pecan tree seems to be a pretty good weather prophet. They don't get ready, as a rule, till most of the danger is past. A great majority of the Persian walnuts and pecans don't begin to pollenate till the tenth of May, and it is very rare that a tree doesn't ripen its nuts there. But once in a while we discover a tree that sets a bountiful crop annually and never matures a nut, because it gets frost bitten. It simply doesn't have the length of growing season.

Mr. Rush: I remember a pecan tree I received, and have had growing for the last six years in Pennsylvania. It was never affected with the cold, and made luxurious growth. But I haven't been so fortunate as to get it to bear, although it throws out catkins in the spring.

President Morris: The pecan tree is known to be hardy as far north as Boston. There are quite a good many near New York City,

some of them fine trees, but not bearing much, and for the most part small nuts.

Mr. Rush: Mr. Jones of Jeanerette, Louisiana, has been at my place, and he says that the growth of the pecan is just as luxuriant there as in Louisiana.

President Morris: The point we want to bring out is this, and I think we ought to emphasize it at this meeting—that pecans suitable for northern planting must include the idea of an early ripening season, earlier than the ripening season of southern pecans.

Mr. Rush: Sometimes there is a provision in nature for that. The tree will adapt itself to the climate, and give a smaller nut.

President Morris: What has been your experience, Mr. Roper?

Mr. Roper: We have only fruited Stuart at Petersburg. All the nuts have been well filled, but much smaller than the Stuart farther south.

Mr. Pomeroy: Mr. Littlepage made the remark yesterday that nature will attend to this largely for us. He spoke of the wood beginning to ripen the middle of August. With us in Niagara County, we expect that with all trees the wood will begin ripening about the first of August, preparing for the winter. Persian walnut doesn't come into blossom till about the last of May or the first of June.

President Morris: It is not mainly a matter of ripening wood, but of ripening nuts, in pecan growing in the North. A good many nuts will remain green, even though the tree will grow well; and we must have nurserymen draw our attention to this difference, when they are sending trees out to us for northern planting. That is a thing that may not be determined right now, but nurserymen must be able to report upon comparative ripening times of various kinds of pecans to be sent north.

We will have the report of the Committee on Nominations.

[The report was accepted and the nominees elected.]

President Morris: We have with us Professor Herrick, who will present his paper on the subject of the scolytus beetle. Professor Herrick has prepared his paper at our request since we came here.

THE SCOLYTUS BEETLE.

Prof. A. W. Herrick, Ithaca, N. Y.

With a residence of a little over a decade in the South, I became more or less intimately connected with a good many of the nut growers of the section, especially the pecan growers. I found them there an intelligent body of men.

The President has asked me to talk just a little on the hickory bark borer. While in Mississippi, I first came into contact with the hickory bark borer by its work on the hickories on the lawn in front of my house and on the Campus. It began killing the trees. I had ten or a dozen trees on the lawn that were from six to eight inches through, and they had made a fine growth but they began suddenly to die. First, I noticed the leaves falling in the summer time, then later in the winter the branches began to die at the top. On investigation, I found that it was this little hickory bark borer. We carried out, as a result of that investigation, a few experiments, and extended them over the Campus, following the recommendations of Doctor Hopkins of the Department of Agriculture, Washington. The results were pretty gratifying. I was able to save those trees on the lawn, and during three or four years succeeding the time we got these experiments into practice, no more had died, and they had kept on making a good growth; and I believe the ravages of the beetle had been checked.

The little beetle belongs to a family called the *Scolytidae*—very small beetles that burrow through the bark of trees, and between the bark and the wood, partly in the bark and partly in the wood. These beetles are interesting in their life history. The female bores through the bark, and then she builds a channel partly in the wood and partly in the bark. She goes along and digs out little niches all along, and in each one of these, deposits a tiny white egg. That soon hatches into the small grub, and the grub begins to burrow out to get his food, and you will find these little burrows running out from the main burrow of the mother beetle. When these grubs reach their growth, each one of them comes out and bores a little shot-hole-like round hole through the bark, so that a tree that is pestered with it will finally have the bark full of these little round holes. You have probably seen a similar thing in peach, plum, and cherry trees.

The hickory bark borer is found all over the eastern United States, from Canada to the Gulf, and as far west as Nebraska. It attacks hickory trees and walnut trees, and as far as I can find, the authorities say probably the pecan. I never found it on the pecan in the South. If it does ever come to attack it in any numbers, it will be a serious pest from the nut grower's point of view.

In this state, it was first noticed by its work on hickory trees in the vicinity of New York City, and it is killing a good many of them. To show its dangerousness—on the estate of Mr. Wadsworth at Geneseo in 1900 and 1901 over an area of two hundred acres, it destroyed ninety to ninety-five per cent of the hickories. It really becomes a most injurious pest. These little fellows running under the bark cut off the cambium layer and girdle it, and kill the tree as effectually as if we

were to take an axe and girdle it. A few can girdle it very quickly.

An infested tree in the summer shows some characteristic effects. The leaves begin to dry and wither, and finally drop. The adult beetles, when they come out in June and July, attack the petioles, leaves, and terminal buds for food, then go down to the larger branches and trunks, and burrow to lay their eggs. The younger top branches begin to die. If you look, you will very often find a little white sawdust in cracks in the bark. That is an indication that they are present. If you take off the bark, you will find such an appearance as I have shown you. Later, you will find these holes all over, showing the work of the beetle.

I will give the life history of the insect very briefly. The insects live over the winter under the bark, as grubs, and in the spring they change to the pupa form, and come out along in June and July. Some may be as late as August. Those beetles go to the branches and leaves, and soon begin laying their eggs. There is only one brood a season, in this locality at least. In a longer season, farther south, there might be more than one, although my experience in Mississippi was that there was only one brood.

A word regarding methods of control. You can readily see that there is no way of getting at the beetle with insecticides after they have gotten under the bark. Doctor Felt mentions the value of spraying the trees in summer to kill adults when they are feeding on the petioles and probably the terminal buds and younger twigs. It is rather doubtful whether it would pay to spray hickory trees at that time, although the expense of spraying large trees is not so great as you might think. We have had experiences here, because it fell to my lot to spray all the elm trees on the Campus last year. I kept very careful account of this. We sprayed between five and six hundred trees. About one hundred are scattered over the hillsides west of the buildings, some a mile from the water supply. We did the work for about eighty-eight cents apiece, each tree having a thorough spray. The largest trees on each side of the street we gave two sprayings for a little less than forty cents apiece.

The real method of getting at this hickory bark borer is for everybody to cooperate and cut those trees out, or at least the affected parts of the tree, before the first of May. I know of no other effective method of getting them. Cut them out and burn them. Some say, peel off the bark and destroy that; but if you do that, you have got to cut off the smallest branches and burn those, and I am afraid you would not get all of the grubs. But it is better, if you can, to actually dispose of the whole tree in some way.

There were three trees on the lawn infested and dying. I cut those out in February, and that evidently stopped the ravages of the beetle. That was carried on over the whole Campus, and it must have stopped

the injuries, because during the three or four years I was there after that, we had no dead hickories from that cause.

That is evidently the only method of getting at them. It has been wondered if we might not go to the Commissioner of Agriculture, and ask him to take this matter in hand and force people to cooperate, because it has become a rather serious problem. It is evident from a perusal of the law that he has power to do that, and perhaps if this Nut Growers' Association wishes to pass resolutions to bring before Commissioner Pearson, they might induce him to take some steps to control this hickory bark borer.

President Morris: If we have evidence that the hickory bark borer can destroy ninety per cent of the hickory trees on an estate so well cared for as the Wadsworth estate, it indicates a menace to the whole hickory forests of the North. In view of this fact, in view of the possibility of ninety per cent of our hickory trees being destroyed by this beetle, it seems to me that we should ask our Commissioner of Agriculture to take charge of the matter, as he has taken charge of the chestnut bark disease, requiring the cooperation of the people in disposing of a question which is so vital among the economic problems of our state. Is there any discussion on this paper?

Doctor Deming: I would like to read an extract from a letter addressed to me by H. W. Merkel, Forester of the Bronx Zoological Park:

"Under Chapter 798 of the laws of the state of New York, passed on July 26th, 1911, the Commissioner of Agriculture is authorized and charged with preventing the spread of just such pests as the Hickory bark-borer, and if this matter be called to his attention promptly and in the right way by such responsible and interested parties as the Northern Nut Growers' Association, there is, undoubtedly, still time to check the further spread of the pest. We have from now until June (the time when a new generation of beetles will emerge) to take whatever action is necessary, and I urge upon you to persuade the Nut Growers' Association to take the necessary steps. I would be glad to have a conference with you on this matter, and will be glad to help you in any way you wish."

I would suggest the appointment of a committee to draw up a strong set of resolutions to be sent to the Commissioner of Agriculture of the State of New York and perhaps of other states, and to the Department of Agriculture. (Referred to Executive Committee for report.)

President Morris: We will have next in order the paper by Professor Lake on the Persian walnut in California.

THE PERSIAN WALNUT IN CALIFORNIA.

Abstract of a Lecture by Professor E. R. Lake, Washington, D. C.

The Persian walnut industry of the United States is confined, practically, to four counties in Southern California, Santa Barbara, Ventura, Los Angeles and Orange. The territory covered is, in a general way, fifty by one hundred and fifty miles in extent, though, of course, only a very small part of this area is planted, and that really the best land in the territory. This industry which yields practically two and one-half millions of dollars annually to the growers is about thirty-five years old, and at present involves the consideration of one variety, the Santa Barbara softshell. While it is true that there are about seventy-five named varieties now grown in the country, the Santa Barbara constitutes the commercial crop and will for some time to come, though effort is being made to find a more desirable variety.

During the past ten years a troublesome pest in the form of a fungous disease which attacks the young twigs and young nuts has awakened an interest in other varieties and at present much work is being done with a view to finding one or more varieties that shall be fully resistant to this foe. At present the University of California, which is the directive factor in this investigation, is recommending the trial of half a dozen of the more promising varieties or forms that have been developed through selection, or chance, in the local orchards. As a result of the effect of this trouble, the crop output has increased very slightly during the past decade, though the area of planted trees has increased very much, hence it is very apparent that some other varieties must be found; for it has been quite conclusively proven that none of the means so effectively used against the fungous troubles that affect other orchard crops are of any avail in this case. When it is noted that there has been practically no advance in the improvement of varieties since the origin of the Franquette and Mayette about one hundred and fifty years ago, except the accidental appearance of the Santa Barbara which was produced presumably from a nut from Chili (!) in 1868 on the grounds of Joseph Sexton, Goleta, California, it is evident that our nuciculturists have been indifferent, especially as to the possibilities of extending the area of production.

Speaking more particularly of California walnut growing, it may be said: The best of soils are selected for this crop; the trees are being planted from forty to fifty feet apart; the best and most common advice is to plant budded or grafted trees, and so far as this advice has been followed the Placentia, an improved Santa Barbara, has been used, though in the newer districts where efforts are being made, with ap-

parent success, to develop this industry, several other varieties are being used, such as the Wiltz, Franquette, Mayette, Eureka, Chase, Prolific, Meylan, Concord, Treyve and Parisienne. Thus far this work is experimental, and only time will determine the success and value of it.

The crop, as with all orchard crops on the Pacific Coast, is cultivated intensively, clean tillage being given, followed by cover crops and in some cases fertilizers accompanied with intercrops.

The trees require very little pruning, and though formerly the heads were started high, they are now formed low and the primary branches trained to ascend obliquely, thus facilitating tillage operations, and, in this respect, even improving upon the high head with spreading or even drooping main branches. While the more progressive planters favor trees one year from the bud, which have been put upon two year old stock, some still prefer two year old tops. Stocks are preferably California black, northern form. This is a large and vigorous tree, while the southern form is often or perhaps better, usually, a large shrub or small tree.

The remarkable behavior of the Vrooman orchard at Santa Rosa, in which there are sixty acres of grafted Franquettes, has been the chief means of stimulating the very extensive plantings that have been made during the past five or six years in the Pacific Northwest. This is the largest orchard of grafted nuts of a single type variety in the United States and is a most excellent example of what follows grafting. The nuts are exceedingly uniform, and large size. They are marketed in the natural color and are especially attractive, particularly when of a reddish-golden tinge.

The trees begin to bear at five or six years, though many instances are recorded where two year olds have borne a few nuts. Usually only a few pounds per year are produced prior to twelve years, after that the yield increases rapidly until at sixteen years the trees will average approximately fifty pounds or more per tree under favorable soil, tillage, and climatic conditions, providing the trees are of selected varieties of good bearing qualities.

One tree, known as the Payne tree, top worked on to a native black, has a record of yielding as much as seven hundred and twelve pounds in one season, though it is not fair to use these figures in estimating the yield per acre of seventeen trees.

While the walnut has received little attention in the Eastern United States, there are sufficient data at hand now to warrant the statement that several meritorious varieties may be successfully grown in favorable localities. These nuts, though not rated as high as the best imported nuts or the choice California product, would successfully compete with the foreign nuts which are now rated as replacement nuts by

the dealers in California's best grade. It is not safe to endorse the view that any waste or abandoned land may be converted into successful walnut orchards, though such lands may in due time produce trees that will bear nuts. A first-class walnut orchard can only be produced upon first-class land, deep, fertile soil, a low water table, an open subsoil, with choice varieties, grafted upon the most suitable stock and then given first-class tree-care.

Professor Lake: I think a man now is making a tremendous mistake who thinks for a moment of advising the planting of seedling walnuts. We are bound to meet the problem of grafted fruit right away. The success in grafting in Washington this year has been such as to make us feel certain that we may safely advise budding yearling stocks and expecting a return of from seventy to ninety per cent of successful sets. Stocks giving best success in budding are California black. About two weeks after the budding is done, the tops are cut off two inches above, and allowed to bend over and protect the buds; and in the West, where they have intense sunlight, they have found it necessary to cover the buds with paper sacks. The budding which has given the largest success is hinge budding, a kind that I haven't seen discussed generally in the East. Instead of being a T at one end, it is a T at both ends. There is a horizontal cut across, another below, and a split between. The buds are taken preferably from the last year's wood. We attempt to take the wood away from the bud, with the exception of that little spongy part that runs up into the bud, and is the core.

Mr. Pomeroy: You speak of the hulling. Do they have to hull the Persian walnuts?

Professor Lake: In many instances, especially in dry seasons, or in those sections where water is not particularly abundant. Ordinarily, hulling is avoided by irrigating just preceding the time of falling. Frequently the growers of large acreages say that it is cheaper to run them all through the huller.

Mr. Littlepage: What would you prophesy about the average seedling Persian walnut tree as to success and quality of nut?

Professor Lake: I was led to think that all that was necessary to do was to plant the walnuts, because most of our authorities of twenty years ago said the walnut would come true to seed. I think out of several hundred trees planted throughout the state, and many we planted ourselves, not a seedling came true. I should think, normally, we should be very much dissatisfied in ten years from planting seedlings. As soon as anyone buds these with Franquette, Parisienne, Concord, Rush, Pomeroy, and others, I am satisfied he will not want to chance it with seedlings.

Mr. Littlepage: This dissatisfaction that may result from setting seedling walnuts, such as Rush, Siebold, Pomeroy, and others, would be just as great, perhaps, as the dissatisfaction resulting in the West, would it not?

Professor Lake: I can't see any reason, but that if there are present any of the native trees, they are bound to cross-fertilize. In California we have the Royal hybrid produced at over a mile and a half distance from any known American blacks. The Royal is a cross between the American black and the California black.

Mr. Littlepage: I don't suppose it would be reasonable to expect that there is a Persian walnut in the northern or eastern United States far enough from some native black to render it safe.

Professor Lake: I should hardly think so. Even if it is, I question whether a nut of real merit will come true to seed.

President Morris: Is it true that even from single type orchards the nuts, while coming fairly true to seed, would give trees widely different in bearing propensities?

Professor Lake: That is very true in this Vrooman orchard that has been developed to the very best possible advantage. There are trees that haven't borne a nut to make them worth while, others have been remarkably vigorous. From these, a few people, knowing of their real merits, are propagating select strains for their own use. They have fifteen or sixteen years' record. I question, if you take a hundred Franquettes from the Vrooman orchard miscellaneously, whether you would get more than ten per cent that would be really as good as the Vrooman.

President Morris: In California I went along the coast this summer from Los Angeles to Oregon and Washington, and looked over orchards. I find that in the West, as in the East, the tendency is for the Persian walnut to store up an undue amount of starch in the kernel. It is apt also to store up an undue proportion of tannin, and to be insipid. That means that in this country we must develop our own type of walnut, and it is quite the exception to find among any Persian walnuts growing on the Atlantic Coast or the Pacific Coast or in the middle of the country walnuts that are free from this tendency to astringency, to insipidity, and to toughness.

When I was on the Pacific Coast looking over specimens in one agricultural collection, a young woman who was showing the collection said, "And here is a lot of Franquettes, and Chabertes, and Mayettes, and Parisiennes that we imported; and do you know, we found our walnuts very much better than those?" I said to her, "Don't deceive yourself in this matter. This self-deception is a mistake. The thing to do is

not to make that kind of a decision, but really to develop in our own country walnuts just as good as those, but not like them."

This was exemplified in a group of walnut raisers. One would say, "Here is a fine walnut that I raised." The other would say, "Yes, that looks pretty good, but you have got to hire a good talker to sell it." Another would say, "Isn't this a fine thin shelled nut?" And the same thing would be said. Now, the whole conversation of that meeting was to the effect that "you have got to have a good talker to sell it." Those people send their good talkers all over the country, and they do sell the walnuts; and it is going to kill the walnut market, unless this is stopped. Those points are ones upon which I would like to have an expression of opinion from Mr. Lake.

Professor Lake: I may say that the western knowledge of the walnut is based very largely upon the character of the Santa Barbara Softshell, and the people in the West are fully satisfied that the Pacific Coast walnuts are the best in the world. I am thoroughly of their belief, too. I agree thoroughly with the doctrine that we have got to improve our own varieties, and that is being done in the best way that we know at present,—by cross-fertilizing and growing the seedlings. A number have been developed the past few years. It is very true that the general public's taste, however, is not up yet to the connoisseur's in this matter, and I am satisfied that the ordinary grade of walnut is going to meet the public demand for a long time yet. The Santa Barbara Softshell will sell to the American public for good profitable prices for some time, and in the meantime, the men who are really wideawake and have a knowledge of the situation are going to endeavor to improve the home strains. I can't see that we can hope for very much from France, for during the last two years the real Mayette of France has been imported, because we have trees bearing in Santa Clara Valley a Mayette as near like the Mayette of Europe as it is possible to make them. The French have not been particularly anxious for us to get their best strains.

President Morris: In this connection, let me say I have seen Mayette, Chaberte, Parisienne,—the best European walnuts—growing in this country, and in this country they do precisely like the best European grapes,—that is, they give us a different product. Imported grafted stock will take from our soil those elements which make an astringent, tough, insipid nut. We have got to recognize it. Don't let us fail to go on record as calling attention to that fact. That means if we import the very best European kinds and plant these, we are going to have the same records as with grapes.

Professor Lake: This matter of quality is of considerable moment to the growers out there. Last year I took occasion to write five of the

leading dealers in New York, like Parke and Tilford. They said in their letters of reply, "We consider the quality as varying from season to season. Some seasons we get the California product better than the European product; other seasons it is just the other way." It leads me to think seasonal variation has a great deal to do with the walnut, possibly. In some cases even the large dealers are not yet agreed that the American product is not yet good enough for the American market.

President Morris: Shall we say that nuts for the connoisseur should not be bleached?

Professor Lake: Modern bleaching consists in running the nuts through a current of salt. It is applied in such a way that it does not do any injury whatever to the flavor or the kernel, unless possibly salting the kernel in cracked nuts would be considered injurious. The bleaching is beautiful. They are not over bleached. They use six pounds of salt to a thousand gallons of water, and run a current of ninety-five volts. It is sprayed on to the nuts as they pass through a revolving cylinder, the spray coming on in a fine mist. As they pass over the cylinder, they are graded and ventilated, and put into sacks. That is after they have been dried. They are ready in about twenty-two hours to be sacked and delivered. The old method of processing in soda and lime and sulphur certainly did injure them.

Mr. Pomeroy: I am just a short distance from Niagara Falls and Buffalo. When any of you are in that section, I would like to have you come and see my trees. There are the seven year old trees my father started, and the orchard is of five or six acres. Some of the seedlings are in bearing now. I have a good many black walnuts in nursery rows, and I am going to begin grafting and budding. One thing I came for was to get information in regard to budding and grafting. In regard to the caring for the trees, it is a great pleasure to watch a tree grow and get it in shape.

Professor Craig: It seems to me that out of the very interesting discussion we have had on this question of the Persian walnut, and out of the discussion which has arisen from the papers of Mr. Littlepage and others on native nuts, we have obtained some very general principles which should be emphasized at this time. The one large principle that I want to call attention to is the principle which says that, in order to develop fruits—and we will include nuts in that general group—which shall be useful to the American public, we shall have to develop them under American soil and atmospheric conditions. In other words, the importation *per se* of European stock of whatever kind is altogether likely to meet with failure. This is the history of American fruit growing from the beginning. The very first beginning of fruit culture in this country was the importation of European fruits, and these uni-

formly failed. Success came when American colonists began to grow American seedlings. The fact that these have prevailed is shown by the percentage of American fruits the large orchardist produces at the present time. Today nearly ninety-nine per cent of our apples are of American origin. The condition of today means success; the condition of a hundred years ago meant failure.

In this Persian walnut business, I think success is going to come to us through such work as Mr. Pomeroy and other interested amateurs are doing throughout the country, in selecting a good type of seedling here and there and growing seedlings from it. This homely old method of producing new types through seedling selection is, I think, going to do a great deal to ameliorate conditions the country over. I simply wanted to impress that idea, that if we nut growers are going to do something to help the nut interests of the country, we can do it by planting nuts and selecting nuts from the best types, again taking the best nuts from the best types and planting them; thus by keeping on selecting, we shall win success in the future.

IS THERE A FUTURE FOR *JUGLANS REGIA* AND *HICORIA PECAN* IN NEW YORK AND NEW ENGLAND?

JOHN CRAIG, ITHACA, N. Y.

[Read by title.]

It is common knowledge that there have been frequent instances of the successful fruitage of Persian walnuts throughout the entire Northeast. The evidence is forthcoming in attractive samples of nuts. Specimens have been received during the past two years from New England, Pennsylvania, New Jersey, and the lake region of New York, as well as the Hudson River section. So far as I am aware, however, *Hicoria pecan* has not fruited to any extent further north and east than southern Indiana.

Is it not remarkable that so little effort has been made to extend the natural range of this superb native nut northward?

The fruiting habits of *Juglans regia* may be regarded as fickle, depending in some cases upon pollination, in others upon climatic conditions at the blooming time. One of its defects is its decided proterandrous habit, which seriously affects pollination and fruit setting. In general, the Persian walnut is capable of cultivation in all safe peach growing sections. Yet in the Gulf States the complaint is made that it is too readily susceptible to stimulating influences of warm weather in the spring. Again, the roots in that section are affected by fungi and insects. Notwithstanding these charges, there should be a future in the

North, as well as in the South, for this fine nut. It is hardly to be expected that success is to be attained in all sections of the country by using exclusively the material, by this I mean the strains and races, we have at the present time. For instance, in the South the root trouble is peculiar to that section, and it is probable that the root difficulties spoken of may be overcome by using native stocks in grafting and budding. The blooming habits, however, can only be modified by the relatively slow process of breeding.

In the North, nature has already provided us with foundation material for the improvement of *Juglans regia*. We have many promising varieties that have appeared more or less fortuitously here and there over the country. It is conceded that all of these do not possess the full range of desirable qualities, but they are sufficiently attractive certainly to challenge the best efforts of the plant breeder. We are encouraged too by such experiences as has come to us in the crossing of *regia* with allied species. A number of crosses of *regia* and *nigra* are recorded from the Pacific Coast. Burbank, Payne, and others have made notable progress in this line. It is a question, however, whether this line offers as certain reward as breeding in narrower lines, using the best individuals of *Juglans regia* which have come to us more or less by chance. The latter appears to me as the best field to operate.

Among the requirements in the Northeast, it may be said that we need hardiness of tree, coupled with a determinate habit of blooming, more than any other characteristics. Of course it goes without saying that we need thin shells, well filled with palatable meat. The work of Messrs. Pomeroy of Lockport, N. Y., J. G. Rush of West Willow, Pa., and other individuals in the Northeast is worthy of all encouragement. Wherever Persian walnuts are producing good nuts here in the Northeast, the best specimens of the best individual trees should be planted in the strong hope of improving the strain. There should be a first rate promise of success in this field, for many of our walnuts are fruiting as individual trees, standing alone and isolated, and therefore, are probably self-fertilized, a circumstance which may assist in shortening the process of improvement by breeding.

Hicoria Pecan. This is undoubtedly the best of all the native nuts, and the most worth while improving. The great popularity which this form of hickory enjoys in the South is undoubtedly due in considerable measure to the fact that it is adapted to a considerable range of territory. This adaptation is the natural acquirement of many years' evolution.

At this time of the year, one sees in fruiterers' shops in New York and other cities appetizing looking baskets, containing cracked shagbarks and pecans. These nuts are enjoying a large share of popularity

at the hands of the consumers. As these two forms are exhibited together, the observer may note the essential good qualities of each, and he may make a mental picture of the possibilities of a union which would eliminate the undesirable features and combine the desirable. The lack of hardiness of the pecan would be strengthened by the hardy northern form, while the breeder would aim to retain the excellent flavors of each, the good qualities of meat, but enclosed by a covering of paper shell texture. We want the hardiness and adaptability of the shellbark, combined with the thin shell, the excellent cracking qualities, and the pleasant flavors of the pecan. Here is a truly attractive field. The fact that returns may be rather slow in maturing should not deter the plant breeder, for sometimes prizes come quickly. Of course the field is one which appeals more strongly to the institution of indefinite life tenure than to the individual whose years of activity are relatively brief.

What nature has done in the way of extending the range of the pecan northward has been clearly set forth in the excellent paper presented by Mr. Littlepage. This indigenous movement from the natural zone of the pecan towards the North and East has undoubtedly been infinitely slow. The important fact has been established, however, that not only has nature extended the natural range in the directions indicated, but Mr. Littlepage has shown that here and there a variety of exceptional merit has appeared, fortuitously and without assistance or guidance from man. These superior varieties are being placed under observation by interested nut enthusiasts like Messrs. Littlepage, Niblack, and McCoy, and others, who are not only studying the nut in its native haunts, but are experimenting with methods of propagation so that we may confidently look forward to a stable supply of these natural selections in the years near at hand.

Here, then, we have the material for founding new races of northern nuts by combining them with our best hardy hickories. Who will gainsay the prophecy that not far distant is the day when we may expect new hybrid strains of great economical importance arising from the union of our northern hickories with the most northerly forms of the pecan? Shall we designate these hybrids as "shellcans," "shagcans," or "hickcans," after the nomenclatural methods of present day plant breeders? The splendid work of our President in the interbreeding of northern types of nuts gives us strong hope to expect results of this nature.

In the matter of propagation we have learned certain essential fundamentals. First and most important is the firmly established fact that southern pecan stocks are unsafe and generally unreliable in the region of the northern hickory. We must grow our own stocks from

northern nuts. We must propagate by using home grown material exclusively, and as to methods of propagation, it is probable that we can follow in general the practice of the southern nurseryman, but unquestionably modifications in procedure will arise out of the sum of our experience which will tend each year to bring a larger measure of success.

This Association will perform an invaluable service in collecting these various experiences, winnowing the sound from the unsound, and disseminating safe deductions and reliable principles to the rapidly increasing band of nut culturists throughout the region of its activities. Our second session has been an unqualified success. May this meeting be surpassed in respect to enthusiasm manifested, experience and knowledge disseminated, by each of the annual conferences to be held in the years to come.

President Morris: Discussion as to the next place of meeting is in order.

Mr. Rush: I would certainly be very glad to entertain the Northern Nut Growers' Association at Lancaster City, Pennsylvania, and will assure you in advance that I will give you the best hospitality that the country can afford. We have now associated with the walnut interests in Lancaster County Mr. Jones of Jeanerette, Louisiana, who has been through that section and is pleased with the work that is being done there. I think it may be policy for the Association to meet there. We can have our night session, and be absent several hours in the morning and look over some of the work. Mr. Jones contemplates topgrafting hickory trees at his new home, and we can have the opportunity of seeing with what success he meets.

The Association voted to accept Mr. Rush's invitation.

President Morris: We will hear the report of the Committee on Resolutions.

RESOLUTIONS PASSED BY THE NORTHERN NUT GROWERS ASSOCIATION,

December 15, 1911.

(Read by Reed.)

Be It Resolved:

That the Northern Nut Growers' Association assembled does hereby express its sincere thanks to the President and Faculty of Cornell University for placing at its disposal the facilities for holding its convention at this time.

That special thanks be extended to Dean L. H. Bailey of the College of Agriculture for the invitation to meet at this place and to Prof. John Craig for his many courtesies shown the Association and its individual members.

That we hereby express our thanks to President Morris and Secretary Deming for their labor and untiring efforts to bring about a successful meeting.

That we also tender our thanks to President Morris for the liberal premiums offered for nut exhibits and to the many who have responded.

That special attention be called to "The Morris Collection of the Edible Nuts of the World," maintained at this place by Dr. Robt. T. Morris, President of this Association. This collection is of the greatest possible educational value to those interested in the study of nuts and nut products.

That, in view of the distribution and rapid spread of the disease known as "Chestnut Blight," especially among the American species, we express our hearty approval of the efforts being made by the federal government, the several state departments and especially the action of the Pennsylvania State Legislature in appropriating the sum of $275,000.00 to aid in studying and combatting this dread disease, and

That we urge the importance of continued efforts along these lines and similar action in all other states in which the chestnut species is of commercial importance, either for timber or nut purposes.

That the Secretary be instructed to send a copy of these resolutions to Hon. James Wilson, Secretary of Agriculture, at Washington, D. C., and to Commissioner of Agriculture or Director of Experiment Stations of such states as within which, according to his judgment, the chestnut species may be of sufficient importance to justify such action.

C. A. Reed,
T. P. Littlepage,
Geo. C. Schempp, Jr.,
Committee.

(Read by Littlepage.)

That we thank Messrs. Collins, Reed, and Lake of the U. S. Department of Agriculture for attendance at this meeting and for their valuable information and assistance, and furthermore that we respectfully invite them to attend the next annual meeting, and in the meantime lend the Executive Committee their assistance in making plans for next season's work and in carrying out the purposes of our organization.

T. P. Littlepage,
Geo. C. Schempp, Jr.

The Association voted to adopt these resolutions.

President Morris: We will adjourn, and the Committee on Competition will meet this afternoon for examination of specimens and decisions in regard to the respective values of the different specimens exhibited.

APPENDIX

MISCELLANEOUS NOTES.

Those in attendance at the meeting were as follows:

Dr. Robert T. Morris, New York City, President
Mr. T. P. Littlepage, Washington, D. C., Vice-President
Dr. W. C. Deming, Westchester, New York City, Secretary-Treasurer
Prof. John Craig, Ithaca, N. Y., Chairman of the Executive Committee
Mr. C. A. Reed of the U. S. Dept. of Agriculture, Special Agent Field Investigations in Pomology
Mr. J. G. Rush, West Willow, Pa.
Prof. J. Franklin Collins, Forest Pathologist, U. S. Dept. of Agriculture
Prof. E. R. Lake, Assistant Pomologist, U. S. Dept. of Agriculture .
Col. C. A. Van Duzee, St. Paul, Minn., and Viking, Fla.
Mrs. W. C. Deming, Redding, Conn.
Mr. W. N. Roper, Petersburg, Va., Editor American Fruit & Nut Journal
Mr. Leonard Barron, Editor Country Life in America, Garden City, L. I.
Mr. A. C. Pomeroy, Lockport, N. Y.
Professors Crosby, de Garmo, Tuck, Herrick, Drew, of the University.
Mr. J. A. Holmes, Ithaca, N. Y.
Mr. Geo. S. Tarbell, Ithaca, N. Y.
Mr. G. C. Schempp, Jr., Albany, Ga.
Mr. H. Brown and Mr. S. V. Wilcox, representing Thos. Meehan & Sons, Germantown, Pa.
Mr. F. M. Rites, Slaterville Springs, N. Y.
Students of the University and others.

The thanks of the association are due Professor Craig for his contribution to the purposes of the convention of the services of his private stenographer which made possible a complete record of all the proceedings and discussions. The success of the meeting is largely due to the thorough preparation made by Professor Craig.

REPORT OF COMMITTEE ON EXHIBITS.

By Department of Horticulture, New York State College of Agriculture.

A collection of the walnuts of commerce, comprising 35 varieties, shown with a specimen of each in section.

A collection of 28 varieties of filberts.

A collection of 35 varieties of pecans.

The Morris collection of edible nuts of the world. This includes not only the nuts of the North, but the fullest collection of the nuts of the tropics that has ever been brought together.

By J. G. Rush, West Willow, Pennsylvania.

Two plates of black walnuts; one plate showing hybridity between Persian walnut and butternut; one plate Paragon chestnuts; one plate especially large American sweet chestnuts.

By A. C. Pomeroy, Lockport, New York.

Four plates of walnuts, showing variation of seedlings; grown on trees varying from six to eight years old.

By W. N. Roper, Petersburg, Virginia.

One plate Mantura pecans.

By T. P. Littlepage, Washington, D. C.

An exhibit of eighteen varieties of seedling pecans, grown in the Wabash region of Indiana and Kentucky. These seedlings represent very promising varieties, some of them being exceedingly thin shelled, most of them well filled and symmetrical in form. Of these, five have been named, to wit: Greenriver, Warwick, Hodge, Hoosier, and Major. Mr. Littlepage exhibits a plate of *Juglans regia* and a fine sample of *Juglans nigra*.

PRIZE NUTS.

Announcement by the President.

In the interest of science and of American horticulture the Northern Nut Growers Association is making an effort to find nut trees of various kinds which produce superior nuts which can be used for propagation.

Prizes for special lots of nuts are offered.

Each lot of nuts sent for prize competition is to consist of twelve nuts from one tree, and the location of the tree is to be well marked, so that no mistake can be made later if cuttings are to be purchased from the owner or finder of the tree.

Nuts are to be sent by mail in a box or bag containing a card with the name and address of the sender plainly written. At the same time a letter is to be written separately, describing the tree in a general way, and giving the name of the town in which it grows.

Packages of nuts and descriptive letters are to be addressed to

PROFESSOR JOHN CRAIG,
Cornell University, Ithaca, N. Y.

and all specimens must be sent by November 15, 1911.

In former years it has happened that several people from the same town have sent nuts from the same tree. Under these circumstances, if the nuts take a prize, the prize must be given according to the date of the first specimens sent.

In addition to the prizes given, valuable varieties receive the name of the person sending them, and this goes on record permanently.

The sender of these nuts will often have opportunity to sell cuttings from the tree later at the common rate of five cents per foot.

Prizes are offered for the following nuts:

1st prize is to be two dollars,
2nd prize is to be one dollar,

and the amount of postage will be returned for all lots of nuts sent which do not receive prizes.

SHAGBARK OR SCALY BARK HICKORY (*Hicoria Ovata*).

Class A. Large thin shelled nuts.
Class B. Very small thin shelled nuts.

SHELLBARK HICKORY, KING NUT, BIG BUD HICKORY (*H. laciniosa*).

Size is particularly desired with this species, but thinness of shell counts high.

PECAN (*H. pecan*).

Pecans sent for competition must be native nuts from New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Indiana and Ohio only, as these nuts are desired for northern horticulture.

OTHER HICKORIES.

Sometimes a tree of various other kinds of hickories will produce a very desirable nut; consequently first and second prizes are offered for any hickory nut not belonging to the above three kinds.

BLACK WALNUT (*Juglans nigra*).

Thin shelled black walnuts of good quality are desired.

BUTTERNUT, WHITE WALNUT (*Juglans cinerea*).

Size and thinness of shell are most important.

PERSIAN WALNUT, ENGLISH WALNUT (*Juglans regia*).

American grown varieties the only ones receiving prizes.

ASIATIC WALNUTS (*Juglans cordiformis, J. Sieboldi, J. Sibirica*).

American grown varieties the only ones receiving prizes.

BEECHNUT.

Size stands first for prize qualifications for Beechnuts.

AMERICAN HAZELS.

Thinness of shell and size are most important.

CHINQUAPIN (*Castanea pumila*).

Size is the most important qualification for this species.

CHESTNUTS.

On account of the rapid spread of the chestnut blight no other kinds of chestnut besides Chinquapins are desired at present.

FREAK NUTS.

Remarkable freaks of any species of edible nuts may win prizes. For instance, a black Walnut with meat growing in only one half of each shell.

R. T. MORRIS, New York City,
President Northern Nut Growers Association.

PRIZES AWARDED IN THE RESULTING COMPETITION.

1. *Hicoria ovata*
   Plate II, first prize:
   Plate I, second prize: Exhibited by Theron E. Platt, Newtown, Conn.
2. *Hicoria pecan*
   Mantura, first prize: W. N. Roper, Petersburg, Va.
   Major, second prize: T. P. Littlepage, Union Trust Building, Washington, D. C.
3. *Hicoria laciniosa*
   First and second prizes: C. N. Stem, Sabillasville, Md.
4. *Persian walnut*
   Nebo, first prize: J. G. Rush, West Willow, Pa.
   Holden, second prize: E. B. Holden, Hilton, N. Y.

5. *Asiatic walnut*
   Juglans Sieboldiana, first prize: J. G. Rush, West Willow, Pa.

6. *Chinquapin*
   No. 2, first prize: J. G. Rush, West Willow, Pa.
   No. 1, second prize: J. G. Rush, West Willow, Pa.

7. *Freak nuts*
   Hickory No. 4, first prize: Lillie E. Johnson, Gowanda, N. Y.

8. *Butternuts*
   First prize: Mrs. Albina Simonds, South Royalton, Vt.

9. *Beechnuts*
   First prize: Malcolm Newell, West Wardsboro, Vt.
   Second prize: William Davis, Rutland, Vt.

10. *Black walnuts*
    First prize: J. J. Robinson, Lamont, Mich.
    Second prize: Dorothy McGrew, R.F.D. 6, Box 77, Kent, O.

The prizes awarded in this competition were contributed personally by the President.

REPORT OF THE COMMITTEE ON THE NOMENCLATURE OF JUGLANS MANDSHURICA AND THE SHELLBARK HICKORIES.

The following are the questions sent by the secretary and the answers received:

"As there seems to be a difference of opinion as to the identity of 'Juglans mandshurica' will you be so kind as to answer the following questions for the benefit of the Northern Nut Growers' Association at their annual meeting at Ithaca, New York, Dec. 14 and 15, 1911.

Q. 1 What type of nut do you consider the "Juglans mandshurica" to be?

J. H. Black, Hightstown, N. J.: Probably a Juglans Regia Manchuria.

T. E. Steele, Palmyra, N. J.: No resemblance to Persian walnut but very similar to butternut, a little longer and thicker than butternut and of little better quality.

Luther Burbank, Santa Rosa, Cal.: *Nigra*, or the connecting link between butternut, eastern black walnut and a trace of Sieboldi especially in foliage.

H. E. Van Deman, Washington, D. C.: It is almost identical with J. Sieboldiana.

J. M. Thorburn & Co., 33 Barclay St., N. Y. City.: Our idea of the type is that it resembles very closely in size, form and color of the shell the English walnut or Juglans regia, though the shell is thicker and the quality of the kernel has not the pleasant flavor of the Juglans regia.

Q. 2 Does it resemble the Persian walnut or the butternut?

J. S. Black: Persian.

T. E. Steele: (See Q. 1).

Luther Burbank: (Does it resemble the Persian walnut—) *No.* (—or the butternut?) Very much in nut but less elongated and not pointed. *Very* thick shell.

H. E. Van Deman: Not similar to either of them.

J. M. Thorburn & Co.: (See Q. 1).

Q. 3 Is it a nut of commercial or other value?

J. S. Black: Yes.

T. E. Steele: I hardly think it a nut of commercial value as the shell is too thick. I should not consider it much better than the butternut.

Luther Burbank: Hardly unless improved. Meat sweet like butternut. Juglans Sieboldi var. Cordiformis is the very best of this type, thin shell, *very* sweet meats. Both these nuts vary *very* widely in form.

H. E. Van Deman: Only of value as a shade tree or as a stock from which to make crosses.

J. M. Thorburn and Co.: As far as we know it has no commercial value here. We sell it only for seed purposes.

Q. 4 How was it introduced into this country?

J. S. Black: By Yokohama Nursery Co. of New York City.

T. E. Steele: I do not know.

Luther Burbank: Some twenty years ago both by myself and the Arnold Herbarium of Newtown, Mass.

H. E. Van Deman: By nuts from Manchuria, I have always understood.

J. M. Thorburn & Co.: We cannot tell. We purchase direct from Japan.

Q. 5 What are the characteristics of the tree?

J. S. Black: Very similar but hardier than Persian.

T. E. Steele: Very similar in growth to that of the Japan walnut, not unlike the butternut. In fact many call them butternuts, but Mr. Van Deman was quite sure they were the Mandshurica when he picked one from the tree I have in mind.

Luther Burbank: Much like Sieboldi.

Van Deman: Very thrifty and luxuriant with large leaves and large growth. Bark light colored.

J. M. Thorburn & Co.: It is a broad-headed tree growing about 60 feet high.

Q. 6 Have you raised them yourself or can you say who has?

J. S. Black: We have raised trees but not the nuts.

T. E. Steele: I have never raised them and know of no one who has.

Luther Burbank: Young trees. My one tree is more spready than other walnuts, and so far though old does not bear.

Van Deman: No I have not grown the trees. Think John or Wm. Parry of Parry, N. J., have them. I have J. Cordiformis.

J. M. Thorburn & Co.: We have never raised them ourselves.

Q. 7 Can you send samples or say where they can be obtained?

J. S. Black: We can furnish trees. Get nuts from Yokohama Nursery Co., New York City.

T. E. Steele: I know of but one tree near here, and I am mailing you one nut that I gathered a year or two ago, too long ago to be of any value except to show the character of the nut. If I can procure another nut or two of this year's growth I will do so and mail to you.

Luther Burbank: Have no samples but enclose usual form. From half shell. (Drawings of this, of the surface character of the nut, and of "size and form of a common sieboldi.")

H. E. Van Deman: Perhaps from the Parrys.

No replies were received from R. E. Smith, of the California Agricultural Experiment Station, Whittier; from Jackson Dawson, of the Arnold Arboretum; or from the Yokohama Nursery Co., 31 Barclay St., N. Y. City.

Summary of Dr. Morris's investigations as given by him on p. 12: The nut described in the U. S. bulletin as *Juglans mandshurica* is the one originally described and named by Maxim more than thirty years ago and is a nut of the butternut type. A few years ago the Yokohama Nursery Co., not knowing that this name had been previously applied, gave it to a nut of the *Juglans regia* type which they distributed. This nut had been previously named by De Candolle, *Juglans regia sinensis.*

NOMENCLATURE OF THE SHELLBARK HICKORIES.

The names "shellbark," "shagbark" and "scalybark" are at present used interchangeably by authors for different species of the hickory. It is advised that the Association take an arbitrary stand on the nomenclature and state our choice of the name "shagbark" for *Hicoria ovata*, "shellbark" for *Hicoria laciniosa* and "scalybark" for *Hicoria Carolinae-septentrionalis.*

This should become a matter of official record and eventually clear up the confusion.

THE HICKORY BARK BORER.

In Country Life in America for October 15, 1911, there appeared an article entitled "Warning!—The Hickory Bark Borer is With Us" by Hermann W. Merkel, Forester of the New York Zoological Gardens.

The following circular was issued by E. F. Felt, New York State Entomologist, under date of Oct. 31, 1911.

DYING HICKORY TREES.

Numerous magnificent hickories have been killed by the pernicious hickory bark borer in the vicinity of New York city. It has destroyed thousands of trees in the central part of the State, while recent investigations show that it is at work in the Hudson valley near Tivoli and probably is injurious in numerous other places. The severe droughts of the last two or three years have undoubtedly been favorable to the development of this pest, since the vitality of many trees has been lowered and they have thus been rendered more susceptible to attack by insect enemies.

The preliminary signs of injury, such as wilting leaves and dead twigs in midsummer are exceedingly important because they indicate serious trouble before it has passed the remedial stage. Examination of injured trees at the present time may show particles of brown or white sawdust in the crevices of the bark, and in the case of some a few to many circular holes appearing as though they had been made by number 8 buckshot. This external evidence should be supplemented by cutting down to the sapwood. The exposure there of the longitudinal galleries 1 to 1½ inches long, about ⅛ of an inch in diameter and with numerous fine, transverse galleries arising therefrom and gradually spreading out somewhat fan-shaped, is conclusive evidence as to the identity of this pest. Only a little experience is necessary before one can recognize the work of this borer.

The insect passes the winter in oval cells as stout, whitish, brown-headed grubs about ¼ of an inch long, the beetles appearing from the last of June to the last of July. Badly injured trees are beyond hope and should be cut some time during the winter and the bark burned before the beetles can emerge; otherwise many will mature and attack other trees next spring. It is particularly important to locate the trees which have died wholly or in part the past summer, because they contain

grubs likely to mature and then be the source of trouble another year. General cooperation in the cutting out of infested trees and burning of the bark as indicated above will do much to check this enemy of our hickories.

E. P. FELT,
State Entomologist.

The following "Press Notice" was issued by the U. S. Department of Agriculture under date of Nov. 15, 1911:—

THE DYING HICKORY TREES.—CAUSE AND REMEDY.

Within the past ten years a large percentage of the hickory trees have died in various sections throughout the northern tier of States from Wisconsin to Vermont and southward through the Atlantic States to central Georgia and to a greater or less extent within the entire range of natural growth of the various species.

CAUSE.

While there are several and sometimes complicated causes of the death of the trees, investigations by experts of the Bureau of Entomology, U. S. Department of Agriculture, have revealed the fact that the hickory barkbeetle is by far the most destructive insect enemy and is therefore, in the majority of cases, the primary cause of the dying of the trees.

HOW TO RECOGNIZE THE WORK OF THE BEETLE.

The first evidence of the presence and work of the beetle is the premature dying or falling of a few of the leaves in July and August caused by the adult or parent beetles feeding on the bark at the base of the leaf stem, but this work alone does not kill the trees.

The next evidence of its destructive work is the dying of part of a tree or all of one or more trees. If the trees are dying from the attack of the beetle, an examination of the inner bark and surface of the wood on the main trunks will reveal curious centipede-like burrows in the bark and grooved on the surface of the wood. These are galleries and burrows of the parent beetles and of their broods of young grubs or larvae. The girdling effect of these galleries is the real cause of the death of the trees.

HABITS OF THE BEETLES.

The broods of the beetle pass the winter in the bark of the trees that die during the preceding summer and fall. During the warm days of March and April these overwintered broods complete their development to the adult winged form, which during May and June emerge through small round holes in the bark and fly to the living trees. They then attack the twigs to feed on the base of the leaves and tender bark and concentrate in the bark of the trunks and large branches of some of the living healthy trees and bore through the bark to excavate their short vertical egg galleries. The eggs are deposited along the sides of these galleries and the larvae hatching from them excavate the radiating food burrows which serve to girdle the tree or branch.

The following recommendations for the successful control of this beetle are based on investigations, experiments and demonstrations conducted by the experts on forest insects of the Bureau of Entomology during the past 10 years.

RECOMMENDATIONS.

1. The best time to conduct the control work is between October 1st and May 1st, but must be completed before the 1st to middle of May in order to destroy the broods of the beetle before they begin to emerge.

2. The hickory trees within an area of several square miles that died during the summer and fall and those of which part or all of the tops or large branches died should be located and marked with white paint or otherwise.

3. Fell the marked dead trees and cut out all dead branches or the tops of the remaining marked trees which still have sufficient life to make a new growth of branches.

4. Dispose of all infested trunks and branches in such a manner as to kill the overwintering broods of the beetles in the bark; (a) by utilizing the wood for commercial products and burning the refuse; or (b) utilizing the wood of the trunks and branches for fuel; or (c) by placing the logs in water and burning the branches and tops; or (d) by removing the infected bark from the trunks or logs and burning it with the branches or as fuel.

5. So far as combating the beetle is concerned it is unnecessary and a waste of time to dispose of trees or branches which have been dead 12 months or more, because the broods of the destructive beetle are not to be found in such trees.

6. Spraying the tops or branches or the application of any substance as a preventive is not to be recommended. Nothing will save a tree after the main trunk is attacked by large numbers of this beetle or after the bark and foliage begin to die.

7. The injuries to the twigs by this beetle do not require treatment.

8. The bark and wood of dying and dead trees are almost invariably infested with many kinds of bark and wood-boring insects which can do no harm to living trees. Therefore all efforts should be concentrated on the disposal of the broods of the hickory barkbeetle, according to the above recommendations.

In order to insure the protection of the remaining living trees it is very important that at least a large majority of the dead infested and partially dead infested trees found within an entire community of several square miles be disposed of within a single season to kill the broods of this beetle. Therefore there should be concerted action by all owners of hickory trees.

On account of the value of the hickory for shade and nuts and for many commercial wood products it is important that the people of a community, county or state who are in any manner interested in the protection of this class of trees, should give encouragement and support to any concerted or cooperative effort on the part of the owners towards the proper control of the hickory bark beetle.

The following is an extract from a letter from Dr. Felt to Mr. Merkel:

"Replying to yours of the 11th inst. I would state that Chapter 798 of the Laws of 1911, a copy of which is enclosed herewith, is, in my estimation, sufficiently comprehensive to include such an insect as the hickory bark borer."

"It is certainly extremely unfortunate that trees past hope and infested by thousands of insects liable to destroy those in the vicinity, should be left standing through the winter and the pests allowed to mature and continue their nefarious work, especially as they could be checked at a comparatively slight expense and by the adoption of measures which ultimately must be carried out unless the trees are allowed to decay in the field. I am much interested in the matter."

The following are extracts from a letter from Dr. Felt to the Secretary, under date of Nov. 21, 1911:

"Your of the 19th is at hand and it gives me pleasure to enclose herewith a copy of a circular summarizing the hickory bark beetle situation in this State and suggesting the prompt adoption of remedial measures. This pest, as you are doubtless aware, is very injurious and has been responsible for the destruction of thousands of hickories, not only in the Hudson valley but also during recent years in the central part of the State. Only a few weeks ago we found a rather bad infestation in the vicinity of Tivoli. You are doubtless familiar with my article on this pest, published in Insects Affecting Park and Woodland Trees, N. Y. State Museum Memoir 8, Volume 1, pages 275-79."

At the annual meeting of the Northern Nut Growers' Association, held December 14th and 15th, 1911, at the New York State College of Agriculture, Cornell University, Ithaca, New York, the following resolutions were adopted:

"Be it resolved that, in view of the distribution and rapid spread of the disease known as the "Chestnut Blight," especially among the American species, we express our hearty approval of the efforts being made by the federal government, the several state departments, and especially the action of the Pennsylvania state legislature in appropriating the sum of $275,000 to aid in studying and combating this dread disase; and

That we urge the importance of continued efforts along these lines, and similar action in all other states in which the chestnut species is of commercial importance, either for timber or nut purposes.

That the secretary be instructed to send a copy of these resolutions to the Hon. James Wilson, Secretary of Agriculture, at Washington, D. C. and to the Commissioner of Agriculture or the Director of Experiment Stations of the states within which, according to his judgment, the chestnut species may be of sufficient importance to justify such action.

Attention is called especially to Farmers' Bulletin No. 467, "The Control of the Chestnut Bark Disease," Issued Oct. 28th, 1911, by the U. S. Dept. of Agriculture.

And be it further resolved that, in view of the depredations in various parts of the country by the "Hickory Bark Beetle," to which attention has been called by a press notice of the U. S. Department of Agriculture, by a circular issued by Dr. E. P. Felt, Entomologist of the State of New York, by an article entitled "Warning;—The Hickory Bark Borer is with Us," by Herman W. Merkel, Forester of the New York Zoological Park, published in Country Life in America, Oct. 15th, 1911, and by an address before the annual meeting of this association by Prof. Herrick of the New York State College of Agriculture; and

In view of the presence of this destructive insect throughout the eastern states, and as far south and west as Mississippi and Nebraska; and

In view of the presumption that its introduction into the pecan area of the United States would be a calamity; and

In view further of the fact that it has been demonstrated that prompt action in the destruction of infested trees will prevent further spread of this pest, and that it is of the utmost importance that such action should be taken before the emergence of a new brood of this beetle in the spring of the year;

The Secretary be instructed to present these resolutions to the Hon. James Wilson, Secretary of Agriculture, Washington, D. C., and to the Commissioners of Agriculture of New York and other states where the hickory bark beetle is a menace, urging immediate and energetic measures against the spread of this dangerous pest which in many localities threatens the hickory tree with serious destruction."

Jan. 31, 1912.

LETTER FROM THE SECRETARY TO HON. CALVIN J. HUSON.

The Honorable Calvin J. Huson,
Commissioner of Agriculture,
Albany, New York,

Sir:—

I have the honor to transmit herewith the resolutions passed by the Northern Nut Growers' Association at its annual meeting held at the New York State College of Agriculture, Ithaca, New York, Dec. 14th and 15th, 1911.

In connection with these resolutions I wish to recall to your attention the fact that by the Laws of New York, Chap. 798, entitled "AN ACT to amend the agricultural law, in relation to fungous growths and infectious and contagious diseases affecting trees," which became a law July 26th, 1911, the Commissioner of Agriculture is given full power to deal summarily with these and other pests.

The testimony of all those fully acquainted with the facts concerning the

"chestnut bark disease," and the "hickory bark borer" is unanimously to the effect that they have done such an amount of damage, and threaten such continued destruction, as to demand that every effort be made to check their ravages, and that even large expense will be inconsiderable in comparison with the enormous loss that will be inflicted if these most destructive pests are not checked.

Attention has been called in the resolutions to the action of the state of Pennsylvania in appropriating the sum of $275,000 for taking action in the case of the chestnut bark disease. Since the passage of these resolutions it is reported that the Governor of the state of Pennsylvania has called a conference to be held at Harrisburg, February 21st and 22nd, for the purpose of considering further action to be taken in the case of this disease. It might be well that your office should be represented at this conference in order that the united action of the states may be brought about and that our state may not continue to lag behind in a matter so seriously affecting so many of its inhabitants.

Detailed information concerning both these diseases is contained in the literature to which reference is made in the resolutions.

May I ask if you will kindly inform me what action, if any, has been taken by the Commissioner of Agriculture, or other department of the state government, for the study or the control of either of the diseases referred to.

REPLY FROM THE COMMISSIONER OF AGRICULTURE.

Feb. 7, 1912.

I have your communication of the 1st inst., duly received and containing the resolutions passed by the Northern Nut Growers Association at its meeting in Ithaca on the 14th and 15th of December last.

Chapter 798 of the Laws of 1911 constitute Sections 304 and 305 of the Agricultural Law, under which this Department has been working for several years for the control of such insects as are distributable by nursery stock, and for the preventing of the establishment in the state of dangerously injurious insect pests and fungous diseases. If the Department were to attempt to control the hickory bark borer, it would require a character of work quite different from anything that we have undertaken for the reason that this insect would not likely be distributed in nursery stock. It is an insect that is not only a native of the country but is quite widely distributed over the state and is one that is given to irregular periodic outbreaks. Of late its depredations have shown seriously in the vicinity of New York along the Hudson Valley and at numerous places in the state. The pest is not amenable to such treatment as can be used against many other deleterious insects. I am informed that the only way now known to control the insect is to first locate it and then destroy all trees or parts of trees in which the grubs are found before the middle of June. It appears to me that to attempt the suppression of the hickory bark borer, it would require a very large force of men and, of course, considerable money.

Relative to the chestnut bark disease, we had a conference at this office in the month of October last and the question was discussed by botanists and foresters from adjoining states and the whole matter was thoroughly thrashed out by those who were present, including representatives of the United States Department of Agriculture, Washington. Invitations have been received from the Governor of Pennsylvania to a conference to be held at Harrisburg on

February 20th and 21st and I have directed a representative of this Department to be present.

Mr. C. H. Pettis, Superintendent of Forests of the State Conservation Commission, joined in our conference here and I learn that someone will be sent from that Commission to Harrisburg.

We have in the hickory bark borer and the chestnut bark disease, two very serious propositions, the importance of which I fully appreciate. It is not clear to me what methods should or can be adopted which will be productive of the greatest good.

Any suggestions that your Association make will be highly appreciated. As soon as I learn of the result of the conclusions at the Harrisburg meeting, I shall be pleased to take the subject up again.

Very truly yours,

CALVIN J. HUSON,
Commissioner.

LETTER FROM THE SECRETARY TO COMMISSIONER OF AGRICULTURE.

March 16th, 1912.

Hon. Calvin J. Huson,
Commissioner of Agriculture,
Albany, New York,

Dear Sir:—

Your letter of February 7th in reply to mine of an earlier date in relation to the hickory bark beetle has been too long unanswered owing to a rush of professional and other work. I regret this delay as I would like to do all that I can to expedite the work which should be done as soon as possible to prevent further damage from this insect.

If I am not mistaken Chapter 798 of the laws of 1911 is a new law under which the Department has not previously worked and which states specifically that "no person shall knowingly or willfully keep any plants or vines affected or infected with—or other insect pest or fungous disease dangerously injurious to or destructive of the trees, shrubs or other plants; every such tree, shrub, plant or vine shall be a public nuisance, etc." It also states that if the Commissioner of Agriculture is notified of the presence of any such pests he shall take such action as the law provides, and the law provides for the destruction or treatment of diseased trees.

This law appears to be not confined in its application to nursery stock, and in this view I am supported by such men as Dr. E. P. Felt, State Entomologist, and Forester Merkel of the New York Zoological Park. It appears that the Commissioner of Agriculture not only has the right but it is his duty to take action under this law when his attention is called to a matter such as the one in question.

The methods of procedure under this law seem to be sufficiently clear. Wherever infected trees are known to exist the Commissioner is directed to order the owners thereof to destroy them. Failure to obey these orders constitutes a misdemeanor and the Commissioner may have his orders carried out by his own agents.

I am glad that you fully appreciate the serious nature of this pest which threatens great destruction of one of our most valuable timber and nut trees and I hope that no obstacle will be allowed to stand in the way of the enforcement of the full intent of the law.

This Association will aid such work in any way in its power.

I would like to call to your attention a report in the Yearbook of the U. S. Department of Agriculture for 1903, page 317, of the successful treatment of an outbreak of this pest at Detroit, Michigan. Also to an address to be published in the transactions of this Association, a copy of which I will send you, by Prof. Herrick in which he recounts the successful treatment of another outbreak.

April 3, 1912.

W. C. Deming, M. D.,
Sec., Northern Nut Growers' Association,
Westchester, New York City.

Dear Sir:—

I am in receipt of your communication of the 16th of March, and have considered carefully the question of what can be done towards the control of the hickory bark beetle. As this is a species which at irregular intervals becomes abundant and capable of doing considerable local damage, yet I am inclined to think that so far as the Department of Agriculture can exercise any control, the hickory bark beetle should be classed among such pests as in a way have like habits of injury, such for instance as the apple tent caterpillar, forest tent caterpillar, green maple worm, fruit tree bark beetle, pine bark beetle, and other thoroughly established native and introduced species, all of which exert injuries at irregular intervals and then disappear. The hickory bark beetle suggests one of the problems which is difficult to handle, and it does not seem that much can be accomplished in a practical way by starting an agitation on the subject. The entomologist of the New York Agricultural Experiment Station, Geneva, says that the insect is common around Geneva, and nearly every seasan an occasional tree succumbs to its work. He further says that he believes that hickory trees have some time in the past suffered from either a severe winter or drought, and that the shot-hole borer is attacking the weakened trees.

Owing to wide distribution, I do not see how I can direct a campaign against this particular insect at this time for the lack of funds. The appropriations at my disposal under Sections 304-305 of the Agricultural Law, are scarcely adequate for the large amount of work which has already been started, and which, owing to its nature, must be kept up and finished each season.

It is my opinion that general publicity would result in accomplishing much, if individual owners were informed how necessary it is to seek out and destroy the dead trees before the 1st of June, in order to prevent the insects attacking healthy trees adjoining. The habits of these insects are thoroughly known and their life histories have been worked out by our entomologists, and very definite information can be given for the control of the hickory bark borer.

Very truly yours,

Calvin J. Huson,
Commissioner.

RESOLUTIONS PASSED AT THE CONFERENCE CALLED BY THE GOVERNOR OF PENNSYLVANIA AT HARRISBURG FEB. 20 AND 21 FOR THE CONSIDERATION OF THE MEASURES TO BE TAKEN TO CONTROL THE CHESTNUT-TREE BARK DISEASE:

WHEREAS this Conference recognizes the great importance of the chestnut tree as one of our most valuable timber assets, having an estimated value of not less than $400,000,000, and

WHEREAS a most virulent fungous disease has made its appearance in wide sections of the chestnut timber region, and already many millions of dollars of damage has been sustained, and the total extinction of the chestnut tree is threatened by the rapid spread of this disease, and

WHEREAS we recognize the importance of prompt action.

THEREFORE, BE IT RESOLVED:

That the thanks of this Conference are tendered to Governor Tener for calling it, and for the courtesies he has shown.

That we appreciate the interest of the President of the United States as evidenced by his communication to Governor Tener, showing as it does, that the head of the National Government is not unmindful of the great danger presented by the Chestnut Blight problem.

That the Commission appointed by the Governor of Pennsylvania be commended for the earnestness and diligence they have shown in the conduct of their work.

That we urge the National Government, the States and the Dominion of Canada to follow the example of Pennsylvania, which is analogous to that of Massachusetts in starting the fight against the gypsey moth, and appropriate an amount sufficient to enable their proper authorities to cope with the disease where practicable.

That we favor the bill now before Congress appropriating $80,000 for the use of the U. S. Department of Agriculture in Chestnut Bark Disease work, and urge all States to use every means possible to aid in having this bill become a law at the earliest moment.

That we believe trained and experienced men should be employed in field and laboratory to study the diseases in all its phases.

That we believe definite boundaries should be established where advisable in each State beyond which limits an endeavor should be made to stamp out the disease.

That we believe an efficient and strong quarantine should be maintained and that it should be the earnest effort of every state, the Federal Government and the Dominion of Canada to prevent the spread of the disease within and beyond their borders. In accord with this thought we strongly commend the efforts being made to pass the Simmons bill now before Congress.

That we believe strong efforts should be made in all States to stimulate the utilization of chestnut products, and in order to do so, we recommend that the Interstate Commerce Commission permit railroads and other transportation companies to name low freight rates so that chestnut products not liable to spread the disease may be properly distributed.

That we recommend the National Government, each State and the Dominion of Canada to publish practical, concise and well illustrated bulletins for educating owners of chestnut trees.

That we believe further meetings on the line of this Conference advisable and we hope the Pennsylvania Commission will arrange for similar meetings.

That we thank the State of Pennsylvania for its intention to publish immediately the proceedings of this Conference.

That copies of these resolutions be forwarded to the President of the United States, to the Governor of every State, to the Governor General of the Dominion of Canada, and the members of the Federal and State legislatures, with the request that they do all in their power to aid in checking the ravages of this dread disease.

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NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

THIRD ANNUAL MEETING

LANCASTER, PENNSYLVANIA
DECEMBER 18 AND 19
1912

PROFESSOR JOHN CRAIG

A FOUNDER OF THE ASSOCIATION

Died 1912

NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

THIRD ANNUAL MEETING

LANCASTER, PENNSYLVANIA

DECEMBER 18 AND 19, 1912

THE CAYUGA PRESS
ITHACA, N. Y.

1913

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Wyman, Willis L., Park Rapids, Minn.

---

*Honorary Member. †Life Member

Constitution and Rules of the Northern nut Growers Association.

Name. The society shall be known as the Northern Nut Growers Association.

Object. The promotion of interest in nut-producing plants, their products and their culture.

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the approval of the committee on membership.

Officers. There shall be a president, a vice-president, and a secretary-treasurer; an executive committee of five persons, of which the president, vice-president and secretary shall be members; and a state vice-president from each state represented in the membership of the association.

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the subsequent year.

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

Discipline. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

Committees. The association shall appoint standing committees of three members each to consider and report on the following topics at each annual meeting: first, on promising seedlings; second, on nomenclature; third, on hybrids; fourth, on membership; fifth, on press and publication.

Northern Nut Growers Association

THIRD ANNUAL MEETING

DECEMBER 18 AND 19, 1912

AT LANCASTER, PENNSYLVANIA

The third annual meeting of the Northern Nut Growers Association was held in the Court House at Lancaster, Pa., beginning December 18, 1912, at 10 A. M.; President Morris presiding.

The Chairman: The meeting will be called to order. We have first an address by the Mayor of Lancaster, Mayor McClean. (Applause.)

Mayor McClean: Ladies and gentlemen of the Northern Nut Growers Association:

The Mayor of a city of the size of this, in which conventions meet so frequently, is so often called upon to make a speech that the prospect of having to do so causes him some disturbance of mind, not only on the day of the delivery of the speech but for many days preceding; but I confess that the invitation to come here to-day has had no such effect on me. I am very glad to meet and mix up with the members of this organization. The evolutionists tell us where we came from; the theologians, where we are going to; but no matter how much we may differ as to the theories of these respective leaders of thought, upon one thing we can all agree and that is that we are here. You ladies and gentlemen representing the Northern Nut Growers Association are here to interchange opinions and discuss questions which have to do with the greater success of the very useful industry, the youthful and useful industry, in which you are engaged. I am here as the Mayor of this goodly town to tell you that you are not looked upon as intruders; that we will be blind when you help yourselves to our wine flasks, but that we will not be deaf should you ask for more. I am thoroughly in sympathy with the purpose of this organization, understanding it to be the encouragement of the planting of nut bearing trees in order that an addition to our present food supply may be provided; and that much waste land, now profitless, may be taken up and converted to practical and profitable uses; and further that through the medium of such tree planting and tree care as you propose, landscape embellishment in greater

degree than that which now exists may be provided. We hear very much about conservation these days and it seems to me that the proposition which you advance is conservation in a very worthy and very high degree. The soil and climate of Lancaster County seem to be peculiarly adapted to the growing of trees bearing nuts and fruits, and I am sure that the result of this convention will be to stimulate locally a very great interest in this worthy undertaking. You have chosen wisely in selecting Lancaster as the place for this meeting, because we feel and we are satisfied that you will agree, after you have been here a few days, that this was the town that Kipling had in mind when he wrote of the town that was born lucky. (Laughter.) Here you will find all the creature comforts, everything that makes for the pleasure of existence, good food and good water, and if there be any of you who have a liking for beverages other than water, it may be some consolation to you to know that in this vicinity the mint beds are not used for pasture, the punch bowls are not permanently filled with carnations, the cock-tail glasses show no signs of disuse and the corkscrew hangs within reach of your shortest member. (Laughter.) We are a great people over this way. Perhaps you are not aware of that, but we bear prosperity with meekness and adversity with patience. We feel that we can say to you, without boasting, if you seek a pleasant country, look about you. You may not know it, but it is a fact and the United States census reports ever since census reports have been made will prove it, that the annual valuation of the agricultural products of the county in which you now sit exceeds that of any other county in all this great nation. (Applause.) Another bit of local history may surprise you when I tell you that the combined deposits of the banks of Lancaster County approximate the enormous amount of fifty million dollars, that they are larger than the total deposits of any one of seven states in the Union that I can name and that they exceed the combined deposits of two of those seven states. But I don't want to take up your time with a recitation of local history, because I feel that your Lancaster colleagues will give you all the information, and I don't want to spoil their pleasure in giving it by anticipating them. I congratulate you upon the success of this convention. I applaud the purpose for which you are united. I felicitate you upon your achievements up to this time, and predict for you a greater measure of usefulness and advantage in the time to come, which usefulness and advantage, let me suggest, can

be made yours more promptly, certainly more surely, by your proceeding upon the principle that whatever is of benefit to the organization as a whole must be of benefit to each of its members, either directly or indirectly. I trust that you will go on with this good work and stimulate enthusiasm in your purpose in a nation wide way, working together with one common object, proceeding under the motto of the Three Guardsmen of France, "One For All and All For One." I now extend to you the freedom of the city. Roam where you will. Just one bit of advice I have to give. Contrary, perhaps, to general report, this is not a slow town and therefore you are in more danger of being run down than run in. (Laughter.) I will not follow the time honored practice of handing you the keys of the city, for the reason that when I heard you were on the way, I had the old gates taken off the hinges in order that your incoming might be in no way impeded. (Laughter.) And now, in the name of the city of Lancaster, its heart filled with the sunny warmth of July, I bid you welcome and promise that we will try to extend to you a hospitality as generous as golden October. (Applause.)

The Chairman: Will Mr. Littlepage please respond to the Mayor's kindly address of welcome ?

Hon. T. P. Littlepage: Mr. President: On behalf of the members of the Northern Nut Growers Association, I desire to thank the Mayor very cordially for his delightful words of welcome to this city. We feel that the words haven't any strings to them, such as were indicated in a little poem I noticed the other day, which said that a young man took his girl to an ice cream parlor and she ate and she ate and she ate until at last she gave him her heart to make room for another plate. (Laughter.) There apparently isn't anything of that in the cordial welcome which we have received here to this great County of Lancaster. I know now after hearing the Mayor's discourse upon the great resources of this county, why it was that a young fellow who had rambled out into the West and happened to drop into an old fashioned protracted meeting, when asked to come up to the mourners' bench, objected somewhat, and finally when they said, "Well, young man, you've got to be born again;" replied, "No, it isn't necessary, I was born in Lancaster County, Pennsylvania." (Laughter and applause.) I understand now why the young man was so sanguine, why it wasn't necessary to be born again, even under the auspicies of the Great Spirit. It is very gratifying indeed to be in the midst of a great county

of this kind that has made one of the great basic industries so successful. It takes three things to make a really great nation; it takes great natural resources, it takes great policies and it takes great people. We have nations in this world where the resources, the possibilities of agriculture and all lines of human endeavor are as unlimited, almost, as ours, but they haven't the people and in the cases where they have people of the right kind, they haven't adopted the policies. It takes those three things for any county, any state or any nation to be really great, and it is indeed gratifying to those of us who believe in the highest development, the best for humanity, to come into a county where the people, through their industry, their policies of advancement, have made that county one of the best farmed agricultural counties in the United States; and that is saying a great deal when you consider the greatness of this nation and her immense wealth and resources. It is indeed gratifying to all of us who are spending some time and some effort to further somewhat the advancement of the country along horticultural lines, to be met with a cordial welcome and to come into this community that has so highly developed her various resources: so, on behalf of this Association and all its members, even the members that are not here, those of them who might, if they desired, take advantage of the Mayor's corkscrew and carnation bowl, I thank the Mayor and thank the citizens of this County and say that we are delighted to be among you. (Applause.)

The Chairman: We will now proceed with the regular order of business. As my paper happens to be placed first on the list, through the methods of the Secretary, I will ask Mr. Littlepage to kindly take the chair while I present notes on the subject of hybridizing nut trees.

THE PRACTICAL ASPECTS OF HYBRIDIZING NUT TREES

Dr. Robert T. Morris, New York

In the experimental work of hybridizing nut trees, we soon come to learn that a number of practical points need to be acquired before successful hybridizing can be done. This is a special field in which few have taken part as yet, and consequently any notes upon the subject will add to the

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OF NEW YORK

First President of the Association, 1911 and 1912

sum total of the knowledge which we wish to acquire as rapidly as possible. First, in collecting pollen; it is important to shake our pollen into dry paper boxes. If we try to preserve the pollen in glass or in metal, it is attacked by various mould fungi and is rapidly destroyed. We have to remember that pollen consists of live cells which have quite as active a place in the organic world as a red squirrel, and the pollen grains need to breathe quite as much as a red squirrel needs to breathe. Therefore they must not be placed in glass or metal or tightly sealed. Further, the pollen grains need to be kept cool in order to avoid attacks from the greatest enemy of all organic life, the microbes or the lower fungi. Probably we may keep pollen for a longer time than it could ordinarily be kept, if it is placed in cold storage, but practically I have tried the experiment on only one occasion. Last year I wished to cross the chinkapin with the white oak. The white oak blossoms more than a month in advance of the chinkapin in Connecticut, and the question was how we could keep the white oak pollen. Some of it was placed in paper boxes in cold storage; some in paper boxes in the cellar in a dry place. Pollen which had been kept in the cellar and pollen which had been kept in cold storage were about equally viable. It is quite remarkable to know that pollen can be kept for more than a month under any circumstances. Hybridization occurred in my chinkapins from this white oak pollen. Sometimes, where the flowering time of such trees is far apart, it is important to know how we may secure pollen of one kind for the female flowers of the other. Two methods are possible. In the first place, we may secure pollen from the northern or southern range of a species for application upon pistillate flowers at the other end of the range of that species. Another way is to collect branches carrying male flowers before the flowers have developed, place them in the ice house or in a dark, cold room without light until the proper time for forcing the flowers, and if these branches are then placed in water, the water changed frequently as when we are keeping flowers carefully, the catkins or other male flowers will develop pollen satisfactorily a long time after their natural time of furnishing pollen, when they are brought out into the light. In protecting pistillate flowers from the pollen of their own trees, with the nut tree group where pollen is wind-borne rather than insect borne, I find that the better way is to cover the pistillate flowers with paper bags, the thinner the better, the kind that

we get at the grocery store. It is best to pull off the undeveloped male flowers if they happen to be on the same branch with the female flowers, and then place the bags over the female flowers at about the time when they blossom, in advance of pollination of the male flowers. It is not safe to depend upon pulling off the male flowers of an isolated tree and leaving the female flowers without bags to protect them from pollen of the same species or of allied species, for the reason that wind may carry pollen to a great distance. One of Mr. Burbank's critics—I am sorry he has so many, for they are not all honest or serious—one of his critics, in relation to the crossing of walnuts, said that it was due to no particular skill on the part of Mr. Burbank, for, whenever the wind blew from the east, he regretted to say that his entire orchard of Persian walnuts became pollinized from the California black walnuts nearly half a mile away. This is an exaggeration, because the chances are that most of the Persian walnuts were pollenized from their own pollen, but in the case of some Persian walnuts blossoming early, and developing female flowers in advance of male flowers, pollen might be carried to them from half a mile away in a high wind from California black walnut trees. Black walnut pollen would then fertilize pistillate flowers of the Persian walnut. I have found this a real danger, this danger of wind-pollination at a distance, much to my surprise. Last year I pollinized one or two lower branches of female flowers of a butternut tree which had no other butternut tree within a distance of a good many rods, so far away that I had no idea that the pollen would be carried from the tree with male flowers to the one which happened to have female flowers only that year; consequently I placed pecan pollen on the female flowers of the lower branches of this butternut tree without protecting them with bags, and left the rest of the tree unguarded. There were no male flowers on that butternut tree that year. Much to my surprise, not only my pollinized flowers but the whole tree bore a good crop of butternuts. This year, on account of the drought, many of the hickory trees bore female flowers only. I do not know that it was on account of the drought, but I have noted that after seasons of drought, trees are apt to bear flowers of one sex of the other, trees which normally bear flowers of both sexes. This year a number of hickory trees bore flowers of one sex only, and I noted that some shagbark trees which had no male flowers had fairly good crops of nuts from pollen blown from a distance

from other trees. I had one pignut tree (H. Glabra) full of female flowers which contained only one male flower, so far as I could discover and which I removed. On one side of this tree was a bitternut; on the other side a shagbark. This tree bore a full crop of pignuts, (Hicoria glabra) evidently pollinized on one side by the bitternut and on the other side by the shagbark These points are made for the purpose of showing the necessity of covering the female flowers with bags in our nut tree hybridizations. We must sprinkle Persian insect powder inside the bags or insects will increase under protection. When we have placed bags over female flowers, it is necessary to mark the limb; otherwise, other nuts borne on neighboring limbs will be mistaken for the hybridized nuts unless we carefully place a mark about the limb. Copper wire twisted loosely is, I find, the best. Copper wire carrying a copper tag with the names of the trees which are crossed is best. If I mark the limb with string or with strong cord I find there are many ways for its disappearance. Early in the spring the birds like it so well that they will untie square knots in order to put it into their nests. Later in the season the squirrels will bite off these marks made with cords for no other purpose, so far as I know, except satisfying a love of mischief. Now I am not psychologist enough to state that this is the reason for the action of the red squirrel, and can only remember that when I was a boy I used to do things that the red squirrel now does. (Laughter.) Consequently, on that basis, I traced the psychology back to plain pure mischief. Red squirrels and white footed mice must be looked after with great care in our hybridized trees. If the squirrels cannot get at a nut that is surrounded by wire cloth, they will cut off the branch and allow it to fall to the ground and then manage to get it out. White footed mice will make their way through wire, and mice and squirrels will both manage to bite through wire cloth unless it is very strong in order to get at the nut. The mere fact of nuts being protected by wire cloth or in other ways seems to attract the attention of squirrels. One of my men, a Russian, said, in rather broken English, "Me try remember which nuts pollinized; no put on wire, no put on tag, no put on nothing; squirrel see that, see right straight, bite off one where you put sign for him." (Laughter.) The best way for keeping squirrels and white footed mice from ascending a tree, I find is by tacking common tin, slippery smooth tin, around the trunk of the tree and this may be left on only

during the time when squirrels are likely to ascend the tree. They will begin long before the nuts are ripe. In the case of hazel nuts, I have surrounded the bushes with a wire fence or wire mesh, leaving a little opening on one side, and have placed steel traps in the opening. Now here enters a danger which one does not learn about excepting from practical experience. I went out one morning shortly after having thought of this bright idea and found two gray squirrels in the traps. They had followed their natural instinct of climbing when they got into the steel traps, and climbing wildly had broken off every single branch from those hazels which carried hybridized nuts. There wasn't one left, because the squirrels when caught had climbed into the trees and had so violently torn about with trap and chain that they had broken off every single branch with a nut on it. So many things happen in our experiments that appeal to one's sense of the ludicrous, if he has a sense of humor, that I assure you nut raising is a source of great delight to those who are fond of the drama.

The field of hybridizing nut trees offers enormous prospects. We are only just upon the margin of this field, just beginning to look into the vista. It has been done only in a limited way, so far, by crossing pollen and flowers under quite normal conditions. We may look forward to extending the range now of pollinization from knowledge based upon the experiments of Loeb and his followers in biology. They have succeeded in developing embryos from the eggs of the sea urchin, of the nereis, and of mollusks, without spermatozoa. Their work has shown that each egg is a single cell with a cell membrane and it is only necessary to destroy this cell membrane according to a definite plan to start that egg to growing. Life may be started from the egg in certain species without the presence of the other sex. This may lead us into a tremendous new field in our horticultural work. We may be able to treat germ cells with acids or other substances which destroy the cell membrane so as to allow crossing between very widely separated species and genera. Loeb, by destroying the cell membrane of the sea urchin, was enabled to cross the sea urchin with the star fish, and no one knows but we may be able, following this line of experimentation, eventually to cross the shagbark hickory with a pumpkin and get a shagbark hickory nut half the size of the pumpkin. That is all! (Applause.)

(President Morris then took the chair.)

The Chairman: Please let me add that the hickory pumpkin idea is not to be taken seriously. That is a highly speculative proposition. I have found some times that, in a very scientific audience, men who were trained in methods of science, had very little selvage of humor,—little margin for any pleasantry, but this highly speculative suggestion, curiously enough, is not in fact more speculative than would have been the idea twelve years ago that you could hatch an egg, start an egg to development—without fertilization.

Mr. Hutt: I would like to ask how widely you have been able to cross species ?

The Chairman: It has been possible to cross species of hazels freely with the four species that I have used, the American hazel, Corylus Americana; the beak hazel, Corylus rostrata; the Asiatic, Corylus colurna, and Corylus pontica. These apparently cross readily back and forth. With the hickories I think rather free hybridization occurs back and forth among all, but particularly in relation to groups. The open-bud hickories, comprising the pecan, the bitternut, the water hickory, and the nutmeg hickory, apparently, from my experiments, cross much more readily among each other than they cross with the scale-bud hickories. The scale-bud hickories appear to cross much more freely among each other than they cross with the open-bud hickories; not only species but genera may be crossed, and I find that the walnuts apparently cross freely with the open-bud hickories and the open-bud hickories cross with the walnuts. I have thirty-two crosses between the bitternut hickory and our common butternut, growing. All of the walnuts apparently cross rather freely back and forth with each other. I have not secured fertile nuts between the oaks and chestnuts, but I believe that we may get fertile nuts eventually. The nuts fill well upon these two trees fertilized with each others' pollen respectively, but I have not as yet secured fertile ones. We shall find some fertile crosses I think between oaks and chestnuts, when enough species have been tried.

Mr. Hutt: Do you notice any difference in the shapes of any of those hybrids, the nuts, when you get them matured and harvested ? Do they look any different from the other nuts on the tree ?

The Chairman: There isn't very much difference, but I seem to think that sometimes the pollen has exercised an influ-

ence upon the nuts of the year. Theoretically it should not do so, but I noticed one case apparently in which I crossed a chinkapin with a Chinese chestnut, and the nuts of that year seemed to me to present some of the Chinese chestnuts' characteristics.

Mr. Hutt: This year I crossed a number of varieties of pecans and in nearly all those crosses there was to me quite an evident difference in the nuts. For instance those gathered off certain parts of a pecan tree of certain varieties, Schley or Curtis or Frotscher, would be typical nuts, but those hybrids or crosses that I produced were distorted, more or less misshapen and seemed to have peculiarities; so that when we came to look over the colony we were in doubt whether they were hand pollinated hybrids or had been pollinated before we got the blossoms covered. Many of them evidenced a great number of distortions, and one of them I remember particularly whose shell was so thin it was just like a piece of brown paper; and there were several peculiarities that were quite noticeable in those hand pollinated nuts.

The Chairman: That is a very interesting point. When we come to consider deformities of nuts we shall find very many cases due to the character of the pollinization. I crossed the Persian walnut with the shagbark hickory and had nuts that year of just the sort of which Mr. Hunt speaks, with shells as thin as paper. One could crush them with the very slightest pressure of the finger. The shells were not well developed. Unfortunately the mice happened to get at all of those nuts. I don't know if they were fertile or not. The kernels were only about half developed. I should look for deformity in these nuts rather than a taking on of the type of one parent over the other, the idea being based on theoretical biological considerations. We had last year a photograph of a tree in California which apparently was a cross, a very odd cross—does any one remember about that California tree ?

Mr. Wilcox: It was a cross between Juglans Californica and the live oak.

The Chairman: Both the foliage and the nuts were very remarkable and pertained tc characters of these two trees. Such a cross to my mind would be wholly unexplainable excepting on the ground recently brought out by Loeb and his followers in crossing the lower forms of animal life and finding that the cell membrane of the egg, if destroyed, will allow of very wide fertilization subsequently with other species. It occurs to me

now—I had no explanation last year, but it occurs to me now, knowing of Loeb's experiments—that it is possible that one of the parents, the parent California oak tree carrying the female flowers, might have had its sex cells subjected to some peculiar influence like acid, sulphurous acid, for instance, from some nearby chimney. Sulphurous acid perhaps from someone merely lighting a match to light a cigar under the tree; he might have so sensitized a few female flowers, may have so injured the cell membrane of a few female germ cells that cross pollinization then took place from a walnut tree. It is only on some such ground as the findings of Loeb that we can explain such a very unusual hybridization as that, which appeared to me a valid one, of a cross between an oak and a walnut.

(Secretary Deming then called attention to hybrids in the various exhibits.)

Professor Smith: I should like to ask why, if this free hybridization takes place in nature among the hickories, you do not have a perfect complex of trees showing all possible variations in the forest.

The Chairman: In answer to Professor Smith's question I will start from his premises and remark that we do have such complexities. The hickories are so crossed at the present time, like our apples, that even crossing the pollen of various hickory trees of any one species does not promise interesting results unless we cross an enormous number. They are already so widely crossed that it is very difficult sometimes to determine if a certain tree is shagbark or pignut or shellbark or mockernut. For the most part the various species and varieties of hickories retain their identity because their own pollen is handiest. and different species do not all flower at the same time. Their own pollen from the male flowers is apt to fall at the time when their own female flowers are ripe and under these circumstances the chances are very much in favor of the tree pollinizing its female flowers with its own pollen. On the other hand, there is hardly one chance in many hundred thousand for any crossed nut to grow, for the reason that most nuts are destroyed by mice, squirrels, rats and boys. If you have a hickory nut tree growing in a lot, and which has produced a bushel of hickory nuts year after year, do you know of one single nut from that tree which has grown ? In this plan of Nature, this plan of enormous waste of Nature in order to get one seed to grow, the chance for a hybridized hickory nut to grow under normal con-

ditions, is so small that we should have relatively few crossed trees growing wild in Nature, though we do find quite a good many of them.

Professor Smith: If I am not taking up too much time, I would like to put some more questions to you.

The Chairman: That's what we are here for.

Professor Smith: Have you ever tried the plan of serving collations to squirrels ? Why wouldn't it pay to give them portions of wheat and corn ? Second, what percentage of the oak pollen kept in cold storage a month was alive ? Third, what is the range of time that the hybridizer has to make the pollinization ? Must we go on the dot or have we two days or four days or a week, in the case of hickories and walnuts ?

The Chairman: I think possibly as these are three direct questions, I might answer them now. No, I think it would be better to have all questions bearing on this subject brought out and then I will answer all together. So if you will kindly ask all the questions, I will then endeavor to answer them.

Mr. Corsan: The squirrels bothered me last year. I've got forty acres of land for experimental purposes only and I started planting and the little beggars would dig down exactly where I planted the nuts, so I went into town and got a rat trap with a double section so I could catch them alive; and I caught so many by feeding them cheap pignuts, the sweet pignuts from Michigan, that I brought them in and my boys sold them for twenty-five cents apiece. Since then we have never been bothered with red squirrels. For the white footed mice I laid down large doors over some hay or long grass and they gathered underneath and then I lifted the doors up every day and with a stick I smashed hundreds of them. I have posted a notice to leave the skunk and mink alone; I don't want anybody on the place shooting them.

The Chairman: I will first answer Professor Smith's questions. This matter of serving collations for squirrels had best be done as collations are served at political meetings—with a trap attached. You don't know how many squirrels there are in the vicinity or how many white footed mice. You will be surprised at the numbers of the little rascals, and not only that, but the field mice, the common field mouse and pine mouse run in mole holes under the ground and can smell a nut a long way off. They are extremely destructive. What percentage of pollen grains of the white oak were alive ? I do not know. Enough

to fertilize a number of flowers. The sooner pollen is used the better. I cannot answer the question exactly because I did not make an experiment in the laboratory to know what part of the pollen was viable. I put on a good deal of it and there were at least some viable grains in the lot. That, however, is a matter which can be subjected to exact laboratory tests without any difficulty. I am so busy with so many things that I can only follow the plan of the guinea hen that lays forty eggs and sits in the middle of the nest and hatches out all she can. Now the range of time for pollinizing is a thing of very great importance and we have to learn about it. We must all furnish notes on this question. With some species I presume the duration of life of pollen, even under the best conditions, might be only a few days. Under other conditions it may be several weeks; but we have to remember that, in dealing with pollen, we are dealing with a living, breathing organism.

The Secretary: I believe the experiment has been carried to completion of fruiting a thousand trees from nuts grown on one pecan tree without two of the resulting nuts being like one another or like the parent nut. Is that true, Mr. Reed.

Mr. Reed: Yes, you might say ten thousand.

The Secretary: We have an illustration of the variability of the progeny of a nut in this collection of chestnuts by Mr. Riehl out in Illinois. This is a parent nut, the Rochester, and these others are seedlings from the Rochester, except where marked otherwise, some showing a tendency to revert to the parent, and some promising to be improvements on the parents.

The Chairman: Mr. Secretary, I think we'd better confine ourselves to the hybrid question at the present time.

The Secretary: Are not those all hybrids ?

The Chairman: I don't believe any man can tell, unless you get the flowers, because you have the American and European types merging together so perfectly. Some of them show distinctly the European type; others show distinctly the American type. That is what I would expect, however. The practical point is the question of quality. Which one keeps the American quality and which one retains the coarseness of the European type ?

Mr. Harris: Speaking of variations of nuts I think it is well known that there is quite a variation in the nuts of the oak. I noticed in one species, michauxii, which is an oak in the

South, that its nuts varied a great deal. It is something of the type of the chestnut, the white oak or the rock oaks and it varies a great deal.

I found one on my father's range in New Jersey and also one on the Potomac. The variations extend to the trees as well as the nuts.

The Chairman: The oak tree properly belongs in another tree group and some of the acorns are not only edible, but first-rate. In China there are at least three species found in the markets to be eaten out of hand or roasted. Our white oaks here, some of them, bear very good fruit, from the standpoint of the boy and the pig, anyway, and it seems to me that we may properly include the oaks in our discussion. There would be great range in variation of type from hybridization between oak trees and I have seen a number of oak trees that were evidently hybrids, where the parentage could be traced on both sides, that were held at very high prices by the nurserymen. I asked one nurseryman, who wanted an enormous price for one hybrid oak, why he didn't make ten thousand of those for himself next year? It hadn't occurred to him.

If there is no further discussion in connection with my paper we will have Mr. Littlepage's paper on Nut Promotions.

Mr. Littlepage: Dr. Deming said that he thought it might be time that we have something just a little lighter—that either he should read a paper or I. (Laughter.) Inasmuch as he included himself, I took no offense whatever. The subject I have written on, roughly and hurriedly, is Fraudulent and Uninformed Promoters.

FRAUDULENT AND UNINFORMED PROMOTERS

T. P. Littlepage, Washington, D. C.

In the beginning, let me assert my confidence and interest in agriculture in general. This is one of the basic industries, upon the proper understanding and growth of which depends the food supply of the nation. It is admitted by scientists that, other conditions being equal, an adequacy or inadequacy in the supply of proper food makes the difference between great people and undesirable people. This being true, the various operations of agriculture must always be of the greatest concern to those who are interested in the nation's welfare.

MR. T. P. LITTLEPAGE

OF INDIANA

President of the Association

The "back-to-the-farm" movement is being discussed today in various periodicals, but back of the "back-to-the-farm" movement is a philosophy that has not been generally understood. It is not proper here to take time to discuss the reasons why the man in the "steenth" story of some magnificent office building, with telephones, electric lights, elevators, and all modern conveniences, longs for the time when he can roam again amidst the green fields in the sunshine and fresh air, but suffice it to say that in my judgment a majority of the professional men, and men in other walks of life, would, if they could, abandon their various employments and turn again to the soil. The boy on the farm dreams of the days when he can be the president of a bank, have a home in the city, own an automobile, smoke good cigars and go to the show every night. The bank president dreams of the day when he can turn again to the farm and walk in the green fields, where he can shun the various artificial activities of life, drink buttermilk and retire with the chickens.

It may be asked what connection these statements have with the subject, and the answer is this—that in the minds of many thousands of people there is this supreme desire to some day own a portion of God's footstool to which they can retire from artificial and vainglorious environments to those under which they can be their real selves and follow pursuits to their liking. It is this that makes it possible for the promoter of various horticultural enterprises to succeed in interesting in his schemes the clerk, the merchant, the doctor, the lawyer, the school teacher, the preacher, and all others whose occupations confine them within the limits of the great cities.

In the beginning, let us distinguish between the fraudulent promoter and the uninformed promoter. The fraudulent promoter is he who recognizes this great and worthy ambition of many people to buy a spot to which they can some day retire and work and rest and dream and enjoy the coming and going of the seasons, and the sunshine and the shadows, and who capitalizes this ambition, with that industry as his stock in trade which, at the particular moment, happens to offer the most attractive inducements. Those familiar with the industry he is exploiting, can tell him by his actions, by his words, by his nods and winks. It is hard for the crook to disguise himself to the informed.

Distinguished from the fraudulent promoter is the uninformed promoter, but, so far as results are concerned, there is not much difference between them for the innocent investor.

They both lead him to failure. They are unlike only in this, that the pathway of the one is lined with deception, crookedness and chicanery; of the other, with blasted hopes based upon good intentions but bad information. Both lead to the self-same sepulcher which in the distance looks white and beautiful but when reached is filled with the bones of dead men.

There is not much difference after all, when one comes right down to the facts, between the crook who starts out deliberately to get one's money and the fellow who starts out in ignorance and makes great promises of returns that he knows nothing about. Both succeed in getting one's money and both succeed in misleading those who have a desire to lay aside something for their old days. We naturally feel more charity for him who has good intentions, but who fails, than for him who starts out with bad intentions. But, after all, only results count.

Did you ever receive the literature of one of these various concerns that has pecan or apple orchards to sell ? How beautiful their schemes look on paper! With what exquisite care they have worked out the pictures and the language and the columns of figures showing the profits! While writing this article I have before me a prospectus of a certain pecan company that prints columns of attractive figures. Fearful, however, that the figures would not convince, it has resorted to all the various schemes of the printers' art in its portrayal of the prospective profits from a grove set to pecans and satsuma oranges, and it tells you in conclusion that it guarantees by a bond, underwritten by a responsible trust company, the fulfillment of all its representations. Yet what are the facts ? Their lands are located in a section where the thermometer falls to a point that makes highly improbable the profitable growing of satsuma oranges. And all their figures are merely estimates of the wildest character, printed in attractive columns, based upon nothing.

As a member of the National Nut Growers Association I was this year chairman of the committee on orchard records. I sent out blanks, with lists of questions, to many prominent nut growers to see if I could secure data upon which to base a report to the association. The replies I received showed the existence of some very promising young orchards of small size, well cared for, but they also showed that there was no such thing as an intelligent report upon which reliable data as to the bearing records of orchards could be based for any future calculations. There are two reasons for this. First, most of the figures we

have are based upon the records of a few pet trees around the dooryard or garden, grown under favorable conditions. Second, the young groves are not yet old enough for anyone to say, with any degree of accuracy, what the results will be. Therefore, the alluring figures printed in these pamphlets are only guesses.

Furthermore, what of the contract of these concerns ? What does it specify ? You would be surprised to know the legal construction of one of these contracts, together with their guaranty bond. In most cases they advertise to plant, and properly cultivate for a period of five to seven years, orchards of the finest varieties of budded or grafted pecan trees, with satsuma oranges or figs set between. But the guaranty company is usually wise enough to have lawyers who are able to advise them of their liabilities, and about all they actually guarantee is that, after a period of five years, provided all payments have been promptly met, there will be turned over to the purchaser five acres of ground with trees upon it. Five years old ? No, they may not be one year old. Budded or grafted ? No, they may be mere seedlings. Oranges set between them ? No, the orange has passed out of the proposition before the bond stage. The companies generally print a copy of the bond, but usually in such small type that the victim does not read it, though the heading is always prominent. It thunders in the index and fizzles in the context.

Moreover, suppose suit is brought on one of these contracts and bonds ? What is the measure of damages ? What basis has any court or jury for fixing damages ? And be it remembered that courts do not exist for the protection of fools against their folly. The principle "caveat empter" is as old as the common law itself, and it means that the buyer must beware, or in other words, that he should inform himself, and that he cannot expect the courts to protect him where he has failed to exercise due caution and diligence. Therefore, as a lawyer, I should very much hesitate to take on a contingent fee the suit of one of these various victims against a promoting orchard corporation.

However, in any jurisdiction where there is a criminal statute against fraudulent representation and obtaining money under false pretenses, I should not hesitate, if I were the prosecuting attorney, to indict every member of such a corporation, and, to sustain the case, I would simply present to a jury of honest men the representations in their advertising literature, and then have the court instruct the same jury as to the validity and limitations of their contract. Their advertising is brilliant enough to

dazzle the sun. Their contract is as dull as a mud pie.

In addition to all of this comes the question of orcharding by proxy, and the success of the unit or acreage system, and many other similar questions; and let me say that I doubt if there is today in the United States one large development scheme, either in pecan or apple orchards, that will prove of ultimate financial profit and success to the purchaser. The promoter may get rich—he has nothing at stake. In most instances he has the price of the land in his pocket before there is a lick of work done on it, and the payments come in regularly and promptly to take care of his salary and the meager and unscientific development.

Of course I would not be understood as saying that pecan or apple orchards cannot be made profitable. I am of the opinion that reasonable sized orchards in proper locations and proper soil, of proper varieties, with proper care in handling, are good investments, and, as proof of my confidence, I am planting orchards both in the north and south. The adjective "proper" which I have used here may seem insignificant at the start but, believe me, before you have begun to clip the coupons off your orchard bonds this adjective will loom up as important as Webster's Unabridged Dictionary. In fact you will wonder how it has been possible for anyone to forecast in one word such comprehensive knowledge. Think of a man a thousand miles away putting money into the hands of some unknown concern, for five acres of unknown land, to be set in unknown varieties of trees, to be cared for by unknown individuals. Can he not see that, in keeping with all the other unknown factors, his profits must also be unknown ?

We look at a great industrial enterprise, such as the steel trust, and marvel at its success. But it must be remembered that this industry started many years ago, and step by step built furnace after furnace and mill after mill, after the owners had tried out and become familiar with all the factors of that industry, and after great corps of trained experts had been developed, and after science had given to this industry many of the most marvelous mechanical inventions of the age. These facts are overlooked, however, when some fellow steps up and proposes to put a steel-trust-orchard on the market in twelve months. In most industrial enterprises there are well-known and established factors to be considered. In horticultural enterprises, however, no man knows what twelve months hence

will bring. I read the other day with great interest the prospectus of a great pecan orchard started several years ago by a very honorable and high-minded man, and the promises of success were most alluring. What are the facts? The boll weevil came along and wiped out his intermediate cotton crops. The floods came later and destroyed acres of his orchards, and, if he were to write a prospectus today, it would no doubt be a statement of hope rather than a statement of facts. He would no doubt turn from the Book of Revelations, where at that time he saw "a new heaven and a new earth," and write from the Book of Genesis, where "the earth was without form and void."

How many people have been defrauded by these various schemes, no one knows. How many clerks, barbers, bookkeepers, stenographers, students, preachers, doctors, lawyers, have contributed funds for farms and future homes in sections where they would not live if they owned half of the county. How many people have been separated from their cash by literature advertising rich, fertile lands in sections where the alligator will bask unmolested in miasma for the next fifty years, and where projects should be sold by the gallon instead of by the acre.

Some time ago it was reported that inquiries in reference to the feasibility and profits of various orchard schemes had come in to the Bureau of Plant Industry of the Agricultural Department, at Washington, in such numbers that the officials of that Bureau had considered the advisability of printing a general circular, which they could send to the inquirers, advising them to make due investigation, and giving a few general suggestions about proxy farming and orchard schemes. I was advised by a friend in the middle west that the contemplated issuance of this circular by the Bureau of Plant Industry had aroused a number of protests throughout the country, and that various Senators and Members of the House of Representatives had entered strong protests with the Secretary of Agriculture against it. A number of these protests have come to my notice, and they take various forms of opposition, but are all unanimous against the Department of Agriculture offering to the prospective purchaser any information. Various reasons for their stand were given by the protestants, but how flimsy and ridiculous they are when analyzed. Congress for a number of years has been appropriating money and authorizing certain work by the Department of Agriculture. It is the people's money, and the people's Department, and the information gathered by the ex-

perts in this Department ought to be the people's information, and it ought to be possible for any citizen to write the Department a letter about any proposition that he has received from any of these various promoters, and have the advice of those who know most about it.

I suppose the Department of Agriculture has entirely too many duties to perform to undertake a work of this kind, but what an inconsistent position it is for a Member of Congress, who has been voting for appropriations to carry on this work, to appeal to the Secretary of Agriculture to suppress such information in order that some exploiter may get somebody's money under false representations. I think if it were possible today to know the list of concerns and companies who registered, directly or through agents, their opposition to this proposed warning circular, you would have a correct index of the concerns good to let alone. For no honest, reputable individual or company need be afraid of the work or suggestions of that great Department. I have the pleasure of knowing many of the officials in the Bureau of Plant Industry, and never anywhere have I seen a body of men so conscientiously engaged in the work of promoting legitimate horticultural and agricultural knowledge. It is the very life of that great Department, and its officers and employees above everyone else are most interested in seeing the land produce the most and best that it can be made to produce, and they are best qualified to pass upon these matters.

Most of the questions in these various schemes are questions of soil and horticulture. One letter in opposition to the Agricultural Department's attitude, that was brought to my attention, stated that crops varied under different conditions, and that no one was able to tell what a certain soil would or would not produce throughout a period of years, and intimated that the Department of Agriculture might mislead the public; and yet the concern that sent it printed columns of figures guaranteeing returns from pecans and satsuma oranges in a section where orange growing is of very doubtful possibility. Boiling down these objections by the promoters, they come to simply this: That the Agricultural Department, with no motive but to tell the truth, and with its corps of trained experts, might mislead the public, but they (the promoters) could not possibly be mistaken in their fabulous figures compiled for the purpose of getting money from some misinformed victim.

Proxy farming never was a success and I do not think it ever

will be. One of my friends told me a short time ago of a very successful young pecan orchard on the gulf coast. Upon inquiry I found that it was of reasonable size, nine years old, and that the owner had lived in it nine years. It was not 500 acres in extent, or 1,000 acres, or 2,000 acres, but about 20 acres. Last summer I went into a beautiful apple orchard in Southern Indiana and saw about forty acres of trees bending to the ground with delicious Grimes Golden apples. On that particular day there were great crowds of people walking among the trees and admiring the fruit. I too walked among the trees a short time, but of greater interest to me than the trees was the old, gray-haired man who had made the orchard. The trees could not talk, but he could, and he told the story of the years of care, and diligence, and work, and thought, and patience, that showed why it is not possible to cover the mountains of a state with orchards bringing almost immediate and fabulous incomes.

Some time ago I stood talking to the old superintendent of the Botanical Garden in Washington—William R. Smith, now deceased—and while discussing with him the requisites for tree culture, he said "Young man, you have left out the most important one of them all," When I asked him what I had left out, he said "above all things it takes the eye of the master." So it does, and the master is he whose vigilance is continual, who watches each tree as if it were a growing child—as indeed it is, a child of the forests—who has the care and the patience, and who is not dazzled by the glitter of the dollar, but who loves trees because they are trees.

Theoretically, one can figure great successes in big horticultural development propositions, but these figures rest upon theory and not fact. It would be difficult to state all the reasons why I have a firm conviction that such big schemes of every kind will fall, but I believe this conviction is shared by the foremost thinkers in the horticultural world. A four-year-old boy was once taken to see the animals in a circus. He was very much interested, but, when shown the tremendous elephant, shook his head and said "he is too big."

A small grove properly handled ought to be an excellent investment. The various uncertainties and vicissitudes involved can, in a degree, be compensated for by great care; and I suppose it would be possible even with some of these big schemes—by placing enough money behind them—to insure a fair degree of success. It must be borne in mind, however, that these pro-

moters, of whom we have been speaking, are not so much concerned in the successful orchard as they are in big salaries and profits, and, if one has money enough to pay big salaries and profits, and still pay for the proper care of the orchard, then he does not need an orchard. Most of these promoters charge too much for a proper and honest development alone, and too little for the proper development plus the profits and salaries of the promoters. I wish it were not so. I wish the old earth could be made to smile bountiful crops without such expensive tickling, but this is one of the checks and balances that nature places upon her great storehouse of wealth.

The Chairman: This is a matter of very great importance and I hope we shall have a good discussion, from a practical point of view, by men who know about fraudulent promotions and their effect. We ought to go on record in this matter right now. I know of numbers of teachers, doctors and other poor people who have put money into nut promotion schemes without knowing anything about the ultimate prospect of profit.

Mr. Hutt: One noticeable thing about the promoter's literature is that he never knows anything about crop failure, and in the agricultural and horticultural world that is a thing that is painfully evident to a man who has been in business a great length of time. In the promoter's literature it is just a matter of multiplication; if one tree will produce so much in a year, a hundred trees will produce a hundred times as much. I got a letter the other day from Mr. S. H. James, of Beaumont, Louisiana, and he said, "I have been very fortunate, I have actually had two good crops in succession," and when you come to compare that with the promoter's literature—why he knows no such thing as crop failure. Anybody who knows anything about agricultural or horticultural work knows that we have winter and floods and everything else to contend with.

The Chairman: Someone might tell us about failures they happen to know of in promotion schemes.

Mr. Smith: I would like to ask if Mr. Littlepage isn't going to open up that barrel of actual facts that he has about yields?

Mr. Littlepage: Mr. President, I didn't know that I had a whole barrel of actual facts. When I started in several years ago a barrel wouldn't have held all of them, but I think that now I could put the actual facts in a thimble. I've got several barrels of good pecans, however, I'd like to open up and let Mr. Smith sample if he wants to.

The Chairman: Let's hear about frauds from someone who knows how the land was managed and how the trees were managed and how it actually occurred.

Mr. Van Duzee: Mr. President, I feel that I ought to say something, first in commendation of the paper itself. It is a question how far we, as an Association, are responsible for the care of our fellowmen, but at this period when the industry is new, I feel that it is a very legitimate thing for us to do a little work to try and prevent these people from preying upon our fellowmen. The president remarked this morning that something was an evidence of the tremendous waste in Nature. It is true, Nature, in building a forest, wastes a vast amount of time and energy. These people who are preying upon the nut industry today find as their victims the weaklings which Nature buries in the forest. Those things are incidental and we must expect them, but I feel that a paper of this kind, at this time, is a very valuable thing and I hope it will receive wide publication. We cannot say too much to discourage this sort of thing. Now, to respond, in a measure, to the President's request for actual facts, I am confronted with this proposition, that some of the men who have made the greatest failures are men who have done so through ignorance. They are honest men, they are personal friends of mine. I don't care to go too much into details, because they are just as sorry today as I am, but I have seen this done. I have seen hundreds of acres of nut orchards in the South planted with the culls from nurseries bought at a very low figure. I have seen these trees neglected absolutely, not in one case but in many cases. I have seen the weeds as high as the trees at the time when a telegram was received by the the local agent that a carload of the purchasers of these tracts was about to leave to look over their property. I have seen the local manager hustle out, when he got that telegram, and hire every mule in the community to come in and, with a plow, throw a furrow or two to the rows of trees so that they could be distinguished from the weeds they were growing among. As Mr. Littlepage has said, there can be no success in such operations; and I feel, looking at it in a very broad way, that this is a very good time to emphasize the point that those of us who have the greatest experience in the growing of nut trees do not feel that these enterprises are legitimate, or that they promise very much success. (Applause.)

Mr. Pomeroy: I live just a short distance from Buffalo.

A few months ago—I got it on the very best authority—there was some salesman in Buffalo who didn't have time to call on all those who wanted to give him money for pecan propositions. He didn't have time, Doctor, he just had to skip hundreds of them, he said; he was just going from one place to another, making his collections. Buffalo is a city of only about 450,000 people and there must be some money being collected and sent in to somebody.

The Chairman: Very glad to hear of that instance; let's hear of others.

Mr. Littlepage: I would like, if possible, to answer Mr. Smith's question. I didn't know that he referred to facts about these promotions, I thought perhaps he meant facts about nut growing.

Mr. Smith: You said you had made inquiries as to nuts, harvest yields, orchard yields; it was those, particularly, that I had in mind.

Mr. Littlepage: Oh well, I could give those to you readily. There are some very promising orchards, making a good showing under investigation, handled under proper conditions and of proper size. I would not want to say that those things are not possible. Talking specifically of these overgrown schemes, one of them is recalled to my mind, a development company in southern Georgia, that advertises very alluringly. It set out one year a lot of culls; they all died. I am told that they went out the second year and, without any further preparation, dug holes and set out another lot of cells. They too died; and then they went out the third year and planted nuts, and those trees, at the end of a year's growth, were perhaps six or seven inches high, and the salesman from that company, I understood, took one of the prospective purchasers over into a fine grove owned by another man on the opposite side of the road, and let him pick out his five acres from the orchard across the road. That's one type I could multiply indefinitely.

Mr. W. C. Reed: I think this is a very important matter. As a nursery man who has sold a great many trees to promoting companies, I want to say that I have never, with one exception, seen an orchard that has been a success, but I have seen hundreds of failures, some of them where they have set out orchards of 150,000 trees and sold them off in one and ten acre tracts, and in only one case have I seen a success. I think these promotions should be avoided by the nut growers of the North.

The Chairman: This is very valuable information, coming from a dealer.

Mr. Van Duzee: I have found this in the yields of my orchards. Six or seven or eight years ago, I discounted every source of information that I could have access to, as to yields, brought them to a conservative point, submitted them to the best informed men in the United States, and then divided those figures by five as my estimate of what I might hope to accomplish as my orchards came into bearing. I have since been obliged to find some excuses for failing to even approximate those conservative figures. I had this year in our orchard, a 35 acre plot of Frotscher trees which is one of the most promising varieties, six years of age, and there were not five pounds of nuts in the whole plot. I have had an orchard of 36 acres, mostly Frotscher and Stewart, go through its sixth year with less than 200 pounds of nuts to the entire orchard. I have another orchard of 30 acres which in its sixth year has produced less than 100 pounds of nuts. Now many of these promoters guarantee to take care of these orchards, which they are selling, for 10 per cent or 20 per cent, or even half the proceeds of those orchards, from the fifth year. You can see readily that the entire crop of such orchards as I have been able to produce, would not begin to pay their running expenses the sixth and seventh year.

The Chairman: You took good care of yours ?

Mr. Van Duzee: I think so. I think there are many gentlemen in the audience who have been through them, and it is conceded that my orchards are at least fairly good representatives of what can be done under normal conditions.

Mr. Corsan: Are yours southern orchards ?

Mr. Van Duzee: These pecan orchards are in southwestern Georgia.

Mr. Corsan: The Northern Nut Growers Association, as I understand, is a collection of men who are interested in finding out what we can do in the way of growing nuts for the North. We go to the markets and see baskets of cocoanuts, Brazil nuts, California walnuts, but no nuts growing for the market around our neighborhood. In my own city, Toronto, I can see some nut trees because I look very closely at everything, but the average person cannot see them because they are very few. I have a number of experiments on hand. If I succeed in even one of these experiments, I am satisfied to spend my whole life at it. I am not nervous, I can watch a hickory tree grow. (Laugh-

ter.) I want to grow some nuts for the next generation. I haven't the slightest thought of making a copper of money out of it but I am going to enjoy the thing, and that's the idea of the Northern Nut Growers Association, or else I have made a mistake.

The Chairman: Is there any further discussion on the matter of frauds? Does anyone else wish to speak on this subject?

Mr. Littlepage: It is indeed very gratifying to hear the President of the National Nut Growers' Association, Col. Van Duzee, speak on this subject and to have the honor of having him with us as a member of our Association. It is gratifying to have him come out in such strong terms on this question. It has always been his policy and his reputation, so far as I have heard, to stand for what is best and squarest in nut culture.

The Chairman: The paper of Mr. Littlepage is one of very great importance, because the number of frauds associated with an enterprise is an indication of the fundamental value of the cause. These fraudulent nut promoters capitalize the enthusiasm of people who want to get back to the land, just as porters at the hotels capitalize the joy of a newly married couple. (Laughter.) We have in this "back-to-the-land" movement, a bit of philosophy of fundamental character which includes the idea of preservation of the race. Preservation of the race!—why so? Nature made man a gregarious species and, being gregarious, he has a tendency to develop the urban habit. Developing the urban habit, he fails to oxidize his proteins and toxins. Failing to oxidize his proteins and toxins, he degenerates. Recognizing the degenerating influence of urban life, by means of his intelligence he has placed within his consciousness that automatic arrangement, as good as the automatic arrangement which turns water on to a boiler, which says to him, "go out and oxidize your proteins and toxins." That is what "back-to-the-land" means. You've got to begin from this fundamental point. Now then, if this represents a fundamental trait in the character of our species and we are acting in response to a natural law, then must we be doubly careful about having our good intentions, our good methods, halted by unwisdom. That brings to mind the point made about our present Secretary of Agriculture. I am very glad this has been made a matter of record here, for I am sorry to say that in connection with another subject—(health matters)—wherever there has been opportunity for the Secretary to act, he has decided as a matter

of policy on the side of capital and against the side of public interest. Almost every time, so far as we have a record of the action of the present Secretary of Agriculture and of Dunlap and McCabe, his assistants. We ought to state here, in connection with fraudulent nut promotions, that he has acted in favor of capital and against the public interest if it is true. It ought to go as a matter of record from this Association. We may be bold in this matter, but we should be righteously bold because we are speaking for the public interest ourselves. We have nothing to gain; there is nothing selfish about this organization. We may be kindly and say that the Secretary is at the mercy of shrewder men.

Mr. Corsan says that we are interested in scientific work only. That is true at the present time, because all progress must be from a scientific basis. If our care in managing experiments is such that we cannot avoid getting rich, we will accept the result. (Laughter.) I am glad that in connection with this discussion Mr. Corsan made one epigrammatic remark,—that he was not nervous and could watch a hickory tree grow. I tell you there's a lot of wit in that.

Mr. Littlepage: He has good eyesight, Mr. President.

The Chairman: The reason why we have so many fraudulent promotions is largely because of our American temperament; we are so nervous that we can't watch a hickory tree grow. In matters of public health, our Secretary of Agriculture has prevented actual criminals from being brought to justice—he made that his policy.

I think those are the points that I wish to make in commenting upon Mr. Littlepage's paper and if he will make any concluding remarks we will be very glad to hear them. In regard to Mr. Hutt's suggestion that we cannot count on crop success or crop failure mathematically—now, there are fortunes to be made from the proper management of good nut orchards. We know of orchards where very large incomes are at present being made, and I am very glad that the sense and sentiment of this meeting is against quotation of that feature. I have not heard here one word in quotation of orchards which bring incomes of $10,000 a year or more from various kinds of nuts, and we know there are many such orchards. It is the failures upon which we should concentrate our attentions right now, and the reason for failure is not that nut growing is not going to make progress but that we cannot count on our nuts from a mathematical basis. One

of my friends, an old Frenchman, became very enthusiastic about raising poultry. He sent out requests for circulars to every poultry fancier who published circulars, and I will wager that he got 50 per cent of answers to his requests for circulars about fancy poultry. He began to raise chickens, and my father-in-law met him on the street one day and asked how he was getting on with his pullets that were going to lay so many eggs. "Oh," he said, "Ze trouble is with ze pullet; she no understand mathematique like ze fancier. If I have one pullet, she lay one egg every day; if I have two pullet, *perhaps* she lay two egg every day, and if I have three pullet, she *nevaire* lay three egg every day." (Laughter.) Now I think that the remaining time this morning we had better devote to the executive session, then we had better meet at two o'clock for the election of our committee. The meeting then is at present adjourned, with the exception of those who will take part in the executive session, and we will meet again at two P. M. There is one point I wanted to make in connection with Col. Van Duzee's remarks that a certain number of really honest men have allowed their names to be used in connection with promotion propositions. Men who are quite skillful at learning the use of names, have gotten men of good intentions and kindly interest, I know, to lend their names as even officials of nut promotion companies. Besides that, a good deal of garbled literature of recommendation has gone out in their circulars. I have had a number of circulars sent to me quoting abstract remarks that I had made relative to nut culture in general, and this has been applied concretely in circulars; the context did not go with it. I asked a lawyer what I could do about it, and after going over the question he said that I probably was powerless.

After announcements by the Secretary, the convention took a recess until 2 P. M., at which time it was called to order by President Morris and the regular program was resumed as follows:

The Chairman: The executive session will be held after the meeting, as many are here to hear the paper on the chestnut blight, so we will proceed at once to the order of business and listen to the first paper by Mr. Rockey.

Mr. Rockey: This paper deals more particularly with the work that has been done in Pennsylvania. But what has been done here may be considered to be typical of what has been done elsewhere.

RECENT WORK ON THE CHESTNUT BLIGHT

KELLER E. ROCKEY

Forester in charge of Demonstration Work, Pennsylvania Chestnut Tree Blight Commission

The history of the blight, briefly outlined, is as follows:

In 1904 the diseased condition of the chestnut trees around New York City was noted and an examination of them showed that they were being attacked by a disease at that time unknown. Investigations since then have shown that the blight had been at work there and elsewhere for a number of years before that time, but it has been impossible to determine just when it first appeared or where. The disease was studied and described at that time.

On display here are specimens and photographs showing the appearance of the blight so that I will not go into that part of the subject in detail. I hope that you will notice, however, the symptoms by which the disease is recognized: 1st. The small red pustules which produce the spores and, on rough barked trees, appear only in the crevices. 2nd. The peculiar mottled appearance of the inner bark of the canker. 3rd. The discoloration of the outer bark. 4th. The danger signals, such as withered leaves in summer or persistent leaves or burrs in winter, suckers which develop at the base of cankers, and the yellowish cracks which soon appear in the bark over the cankers.

Workers in the Bureau of Plant Industry, Washington, D. C., have been studying the blight since 1908. In the Spring of 1911, a bill creating the commission for the investigation and control of the blight in Pennsylvania was passed, and the active work began in August 1911. The method upon which the Commission is working is outlined in Farmers' Bulletin No. 467, of the Department of Agriculture, and consists briefly of determining the area of blight infection and in removing diseased trees west of a certain line, with the purpose of preventing the western spread of the blight.

This Commission has ascertained as accurately as possible the amount of infection in the various parts of the state and the results are given in a map on display here. The state is divided into two districts by a line drawn along the western edge of Susquehanna, Wyoming, Columbia, Union, Snyder, Juniata and Franklin Counties, which is approximately the western line

of serious blight infection. West of this line a large portion of the state has been scouted, and the remainder will be finished early in 1913. We have learned by experience that in the winter, after the fall of the leaves, the best scouting work can be done. Persistent leaves and cankers along the trunk are readily seen, and more and better work can be accomplished than in the summer, except when the snow is very deep.

Blight infections have been found in counties adjacent to this line: also in Fayette County, near Connellsville, in Warren County, near Warren, and in Elk County, near St. Mary's. These three infections were directly traceable to infected nursery stock, and in one case the blight had spread to adjacent trees. A large area of diseased chestnut in Somerset County illustrates the harm done by shipping infected nursery stock. The centre of this infection is a chestnut orchard where about 100 scions from an infected eastern orchard were grafted to native sprouts in 1908. The percentage of infected trees in the orchard from which the scions were obtained, according to a count made this Fall, averages 80 per cent. Evidently these scions brought the disease into this region, for the grafts have all been killed by the blight and every tree in the orchard is killed or infected by disease. On adjoining tracts over 5,400 infected trees have been cut, and there are a number of others in process of removal, radiating in all directions from the orchard as a center to a distance of three miles. Another infection of 143 trees was found in Elk County. It is thought that three trees at the centre of infection were diseased in 1909, although it is possible that one of these trees was already infected in 1908. In 1910, 27 additional trees were infected; in 1911, 50 additional trees, and in 1912, 228 additional trees. The disease spread in all directions from the center of infection to a distance of 700 feet.

These infections are interesting in showing the rate at which the blight may travel in healthy timber.

These infections have all been removed and it is the expectation that by the end of January 1913 all scattered spot infections will be removed from the territory west of the line previously mentioned, and that, to the best of our knowledge, these western counties will be free from blight. In 1913 the field force will be concentrated on the advance line and the work will be carried eastward. The Commission has the power to compel the removal of infected trees. In the western part

of the state this power has been exercised in the few cases where it was necessary. As a rule, however, the owners are not only willing but anxious to get rid of the infected trees, and our field men are given hearty support by individuals, granges and other organizations. The timber owners of Elk County had printed and posted an announcement that the chestnut blight had been found in the locality and warned the people to be on the lookout for it. In addition the Commission has had a man, for a short time at least, in each of the eastern counties of the state, and their time has been taken up principally by those who requested inspections of timber with the view of determining the percentage of blight infection and the best method to be pursued in combating it and realizing on their timber. Our men are all deputy wardens, with the authority which is attached to this office, and are instructed to do their utmost to prevent fire damage.

An exhibit which consists of specimens showing the blight in various stages together with photographs, literature, etc., was placed in about 30 of the county fairs throughout the state. The appreciation of the public has been so clearly shown that next year it is the intention of the Commission to continue and perhaps increase this phase of the work, and to place large permanent displays at the Commercial Museum, Philadelphia, the State Capitol, Harrisburg, and other places.

Many of the Annual Teachers' Institutes have been reached with a display and lecture. We have arranged also to have a speaker at fully one hundred of the Farmers' Institutes this winter. We are also arranging to have a permanent display at many of the public schools, normal schools and colleges, where instruction on the blight is given. An effort was made last winter to enlist the service of the boy scouts and we are indebted to them for considerable work, chiefly in an educational way. The successful outcome of all our work will depend in a large measure upon the owners themselves, and it is our purpose to give them all the information possible upon the whole subject.

The Commission established a Department of Utilization which is collecting information on the various industries which use or might use chestnut wood, listing the buyers and owners of chestnut wood, thus assisting owners of blighted chestnut trees in marketing their timber to the best advantage. The Department is trying to increase the use of chestnut wood by calling attention to its many good qualities, and thus utilize

the large quantity which must necessarily be thrown upon the market. There has been more or less discrimination against blighted chestnut timber. This has been in many cases unjust, since the blight does not injure the value of the wood for most purposes for which it is used. However, the owners sometimes fail to realize that the blight cankers are the most favorable places for the entrance of the borers, and that where a large number of trees are being considered, a percentage of them will be materially injured by insects which follow blight infection. Where telegraph poles are barked, it is often seen that borers have attacked the wood under blight cankers, and have not touched any other part of the tree. All blighted timber should be cut before death to realize its best value, since insects and wood-destroying fungi cause the very rapid deterioration of dead, standing timber. There has been a good market in almost every locality for poles, ties and the better grades of lumber. Cordwood presents the difficult problem of disposal. The best market for this is in the central part of the state, at the extract plants. The Commission has secured from the Pennsylvania R. R. a special tariff on blighted chestnut cordwood so that this product may be profitably shipped from greater distances than before.

The Commission has inspected all chestnut nursery stock shipped from nurseries within the state and has also provided for inspection of all chestnut stock entering the state. This should prevent a repetition of infections in the western part of the state which might destroy millions of dollars worth of timber.

From time to time publications have been and will be issued by the Commission, which are obtained free of charge upon request, or they may be consulted in the leading libraries throughout the state.

An appropriation for $80,000 was given by the last Congress for scientific research work upon the blight disease and work is being carried out in cooperation with the various states. Several of the Government investigators are now at work upon our force. Some of the most important unsolved scientific problems of the blight, as given by Secretary Wilson, in his message, to Congress, are as follows:—

First, the relation of the disease to climate.

Second, the relation of the parasite to the varying tannin content of the tree.

Third, the origin of the disease.

Fourth, relation of birds and insects to the dissemination of the disease.

Fifth, the nature and degree of resistance of the Asiatic species. Another problem in relation to tree treatment may be added, that is, the relation of spores and myelium to toxic agents.

The Pennsylvania Commission maintained laboratories during the summer at Charter Oak, Centre County, and at Mt. Gretna, Lebanon County. The latter has been moved to Franklin and Marshall College, Lancaster, for the winter. We have also had a laboratory at the University of Pennsylvania, which has been greatly enlarged this fall.

The number of people who informed us that they had discovered a sure "cure" for the blight made it necessary to obtain an orchard near Philadelphia where all such discoverers were given an opportunity to demonstrate the efficacy of their remedies. It might be noted that in every case the blight is thriving as usual. These cures consisted largely of an injection of a toxic principle by some means into the circulation of the tree. In some cases this was accompanied by a fertilizer of some kind, and this fertilizer may account for the apparently improved condition of the tree in some cases, after such remedies were used, since the growth was increased and the leaves and branches had a healthier appearance. This increased growth has not had any appreciable effect upon the rapidity of spread of the blight mycelium. As the experiments are not officially finished and recorded it is too early to give any further data. Our pathologists have also conducted experiments in this same line but no medicinal remedy or fertilizer has yet been found.

The varying chemical constituents of chestnut trees, principally tannic acid, have often been suggested in regard to the origin and spread of the blight. Investigators are now working along this line and we hope, for valuable results before long.

The origin of the disease, as already stated, is something of a mystery, and there is as yet no generally accepted theory, although many people have very pronounced views on the subject. Many puzzling facts have been noted since investigating the disease in Pennsylvania, among them being the large percentage of infection in eastern York and southern Lancaster counties, the relative small percentage in certain localities around which the blight is generally prevalent, and recent infections found in Warren and other western counties, a great distance

from what is known as the western advance line of the disease.

Our pathologists have reported some very interesting facts in regard to the dissemination of the blight. In the preliminary report of the summer's work at our field laboratories the results tend to show:

First, the prolific ascospore stage is very important in causing the spread of the blight, the spores at this stage being forcibly ejected from the pustules and borne through the air for some distance. This ejection of spores takes place under natural field conditions only when the bark has been soaked by rain, but the expulsion of spores is also dependent upon temperature conditions and ceases entirely at temperatures from 42 to 46 degrees F. and below.

Second, the wind plays a large part in local ascospore dissemination.

Third, birds and insects (except ants) are apparently of very little importance in the dissemination of the blight except in providing wounds. Further investigations of the importance of ants is being made during the present winter.

Several kinds of beetles have been observed eating the pustules and are in this way beneficial, since tests show that they digest and destroy the spores. It has also been suggested by workers in the Bureau of Entomology that such beetles, which are of several kinds, may be of value in the attempt to control the disease. These are perhaps the only natural enemies discovered to date.

The proper classification of the chestnut blight fungus has also been the subject of much discussion. Last winter specimens of what in external characteristics appeared to be Diaporthe parasitica were found in western Pennsylvania, Virginia and elsewhere, growing upon chestnut, oak and other species. This condition was puzzling and the subject of some controversy. It has been found, however, that this fungus, called the "Connellsville fungus," is a distinct species closely related to the true blight fungus, being, however, entirely saprophytic. Cultural distinctions are apparent and the ascospores differ in size and shape so that no further confusion need occur.

Upon the question of immunity of certain kinds of Asiatic stock, there is very little to report beyond what was known one year ago. In the investigations made the work has been hampered by the fact that much of the so-called Japanese stock is in reality a hybrid of European or American species. In

1909, 45 Japanese seedling trees were set out at Gap, Lancaster Co., for experimentation along this line. A recent examination showed that 90 per cent are infected. Concerning the variety or purity of this stock, I have not been informed. Our force as well as others are at work upon the problem which will require many years' study.

Previous investigations seem to show that certain pure strains of Japanese and Korean chestnut are resistant to the blight. Blight cankers may be found upon them but they are less easily infected and suffer less than the more susceptible varieties. With this as a working basis, considering the results that have been attained in other fruit by selection and hybridization, the situation is hopeful. Prof. Collins said at the Harrisburg Conference in February that "There is no reason to doubt that we may eventually see an immune hybrid chestnut that will rival the American chestnut in flavor and the Paragon in size".

In southern Europe chestnut orcharding is a well established and profitable industry. In the United States chestnuts have been considered a marketable commodity ever since the Indians carried them to the settlements and traded them for knives and trinkets. The demand has always exceeded the supply and at the present time about $2,000,000 worth of nuts are imported from Europe annually. With the development of the better varieties of the American nut has come an increased activity in the United States and the chestnut orchard industry promises to become one of very large importance. It has an added advantage that the trees can be grown upon the poorer types of soil which are not adaptable for farming or the raising of other fruit.

At the present time there are in what is known as the blight area of Pennsylvania, or eastern half of the State, about 100 orchards ranging from 12 trees up to 400 acres in extent. These orchards are in varying stages of blight infection, some of them being almost entirely free, due to the attention which has been given them. In order to protect such orchards the Commission is compelling the removal of infected trees within a certain radius of them.

As you know the blight has been a very serious factor in this industry. Some of the orchards have been completely annihilated and the income reduced from several thousand or more dollars per year to nothing. Whether or not the blight will

completely wipe out the orcharding industry is a subject of large importance. Personally I believe that chestnuts will be raised commercially in Pennsylvania in increased abundance, and as the various phases of the blight subject are brought to light, keeping the disease under control can be more easily accomplished. At the present time this is being done in certain orchards by the present methods of examining the trees often, treating each infection, or removing the tree. If this policy is successfully pursued for several more years it will demonstrate conclusively that chestnuts can be grown in spite of the blight and this will mean an opportunity to use vast areas of waste land in Pennsylvania and in the other states, in a highly profitable manner.

The Chairman: The subject of the next paper is Some Problems in the Treatment of the Chestnut. It will be presented by Mr. Pierce, after which we will have a general discussion of the entire subject.

Mr. Pierce: Mr. President, ladies and gentlemen: I see that, as we wrote our papers separately, some of the things I had in mind will be similar to those Mr. Rockey had.

SOME PROBLEMS IN THE TREATMENT OF DISEASED CHESTNUT TREES

By Roy G. Pierce

Tree Surgeon, Pennsylvania Chestnut Tree Blight Commission

The problems that present themselves to the growers of chestnut trees concerning the present disease may be summed up under three heads: first, what the disease is, how it is caused, and how it may be recognized; second, what is to be done with diseased trees to bring them to health or to prevent them from infecting other healthy trees nearby; third, what means in the future can be undertaken to keep a tree healthy, that is, to prevent reinfection.

First, what the disease is, how it is caused, and how it may be recognized. The disease known as the chestnut tree blight is caused by the fungus, *Diaporthe parasitica*, which usually finds entrance to the tree through wounds in the bark. The mycelium or mass of fungous filaments gradually spreads through the bark

in much the same manner as mold spreads over and through a piece of bread, even penetrating the wood to a depth of sometimes five annual rings. The spread of the fungus, resulting in the cutting off of the sap flow, is the immediate cause of the wilting and dying of the leaves and branch above the point of girdling. This wilting of the leaves, followed later by the death of one branch after another as the fungus spreads, has given rise to the term "blight" of the chestnut trees.

The danger signals which the chestnut tree displays when diseased are not a few. In summer, when the tree is first affected, the leaves turn yellow-green and wilt, later turning brown. Small burs and withered leaves retained in winter are some signs of the diseased condition of the tree. At the base of the blighted part a lesion, or reddish brown canker, is usually found. This lesion may be a sunken area or, as is frequently the case, a greatly enlarged swelling, known as a hypertrophy. After a branch has become completely girdled sprouts or suckers are very apt to be found below the point of girdling. In old furrowed bark on the main trunk of the tree the presence of the disease is seen in the reddish brown spore-bearing pustules in the fissures. In determining the presence of the fungus in the furrowed bark of old trees, one must learn to recognize the difference between the light brown color characteristic of fissures in healthy growing bark, and the reddish brown color of the fungus. When the disease has been present several years the bark completely rots and shrinks away from the wood, and when the bark is struck with an axe a hollow sound is produced.

Many of the owners of chestnut trees throughout Pennsylvania do not acknowledge that a fungus is causing the death of the trees. They state that since they have found white grubs or the larvae of beetles in nearly every tree that dies, that it has been the larvae that killed the tree. It is acknowledged that generally white grubs are found in dying chestnut trees, and that in nearly all of the large cankers or lesions these grubs are present. However, if one will take the pains to examine the small twigs and branches or the new shoots rising from the stumps, that are diseased, he will not find the grubs present.

Second, what is to be done with diseased trees to bring them back to health or to prevent them from infecting other healthy trees nearby. To bring the trees back to health implies that the disease can be cured. This is not always true for the tree may be already nearly girdled, when the disease is first noticed.

A tree taken in time, however, may have its life prolonged indefinitely though it may have the blight in some portion of it every year. More particularly does this apply to valuable ornamental and orchard trees.

Prof. J. Franklin Collins, Forest Pathologist in the Department of Agriculture in Farmer's Bulletin No. 467 on "The Control of the Chestnut Bark Disease" gives the following: "The essentials for the work are a gouge, a mallet, a pruning knife, a pot of coal tar, and a paint brush. In the case of a tall tree a ladder or rope, or both may be necessary but under no circumstances should tree climbers be used, as they cause wounds which are very favorable places for infection. Sometimes an axe, a saw, and a long-handled tree pruner are convenient auxiliary instruments, though practically all the cutting recommended can be done with a gouge with a cutting edge of 1 or 1 1-2 inches. All cutting instruments should be kept very sharp, so that a clean smooth cut may be made at all times."

All of the discolored diseased areas in the tree should be removed. Small branches or twigs nearly girdled are best cut off. Cankers in the main trunk or on limbs should be gouged out. Carefulness is the prime requisite in this work. If the disease has completely killed the cambium, the bark should be entirely removed as well as several layers of wood beneath the canker. By frequent examination, however, diseased spots may be found on the tree where the mycelium of the fungus is still in the upper layers of the bark. It is not necessary then to cut clear to the wood, but the discolored outer bark may be removed and a layer of healthy inner bark left beneath the cut. The sap may still flow through this layer. The border of the diseased area is quite distinct, but cutting should not stop here but should be continued beyond the discolored portion into healthy bark, at least an inch. The tools should be thoroughly sterilized by immersion in a solution of 1.1000 bichloride of mercury, or 5 per cent solution of formaldehyde, before cutting into the bark outside of the diseased area. Experiments have shown that a gouge or knife may carry the spores into healthy bark and new infection take place. Experiments are being carried on in the laboratory to determine the length of time which spores will live in solutions of different strengths of fungicides.

It has been shown that a cut made pointed at the top and bottom heals much faster than one rounded. The edges of the cut should be made with care so as not to injure the cambium. The chips

of diseased bark and wood should not be allowed to fall on the ground then to be forgotten. A bag fastened just below the canker will collect most of this material as it is gouged out and prevent possible reinfection, which might take place if the material were allowed to scatter down the bark. Canvas or burlap spread around under a small orchard tree might be sufficient to catch all of the diseased chips of bark and wood cut out of the lower infections. This diseased material should be burned together with blighted branches. After completely cutting out all of the diseased parts the cut surfaces should be either sterilized or covered with a waterproofing which combines a fungicide with a covering. Among these might be mentioned coal tar and creosote, or a mixture of pine tar, linseed oil, lamp black and creosote.

The trees which have been killed by blight, or nearly girdled, have been overlooked. These should be cut off close to the ground, the stump peeled and the bark and unused portions of the tree burned over the stump. The merchantable parts of the trees should be removed from the woods promptly, as all dead unbarked wood furnishes an excellent breeding place for the blight fungus.

Third, what means in the future can be undertaken to keep a tree healthy, that is, to prevent reinfection. The spores may be carried by so many agents that it is difficult to prevent reinfection. However it is clear that the farther infected products or trees are removed from healthy trees the less liable they are to have spores carried to them. Cooperation with nearby owners of diseased trees will help solve this problem.

Spraying on a large scale has only been carried on, so far as I know, on the estate of Pierre DuPont, Jr., at Kennett Square, Pennsylvania. At this place there are many large chestnut trees ranging from sixty to ninety feet in height, many of which were planted some sixty-five years ago. Mr. R. E. Wheeler started the work of cutting out diseased limbs and cankers in October 1911, and began spraying with Bordeaux mixture in April 1912. The formula 5-5-50, five pounds of copper sulphate and five pounds of lime in 50 gallons of water was found to be injurious to the foliage in the Spring. This was changed therefore, to 4-5-50, which had one pound less of copper sulphate. This did not seem to injure the foliage.

About 70 trees were sprayed twenty times during the season. Nearly all of these were gone over four times to remove diseased

branches and cankers, once in October 1911, then in early summer and again in September and November 1912. As an example take tree No. 6 which was studied, December 14, 1912. It is 39 inches in diameter at breast height, and approximately 70 feet in height. On this one tree six diseased limbs were removed, and sixteen cankers were cut out. Of these sixteen, two infections continued, that is, were not completely cut out, and had spread; three had infections below old limbs which had been removed, and eleven were healing over. This tree was about 1000 feet away from other badly infected trees, though but 25 feet away from other chestnut trees in the same row. The experiment of Mr. DuPont in spraying shows what can be done on valuable lawn trees. On the whole, these trees look well and healthy. Trees which were not sprayed over three times and were within 50-100 feet from badly blighted trees, became infected in so many different places that it will be necessary to remove them.

One of the problems to be solved next year will be that of the least number of sprayings which will be effective in preventing new infection.

The Chairman: The question of the chestnut blight is now open for discussion.

Mr. Littlepage: I should like to ask these gentlemen how far west they have heard of chestnut blight—that is, heard of it with any degree of authenticity, and also whether or not they care to express an opinion as to what the prospects are in the middle west, say out in Indiana, Illinois and Ohio ?

Mr. Pierce: In answer to that question, I will say that in Pennsylvania we have found infections in Wayne County and also in Fayette County, both near the western extreme of the state, but those have been attended to, very largely, and the boundaries closely determined. In Ohio there have been several reports of the blight being found, but I don't think either of the reports have been proven. There has been a fungus that I have spoken of as the Connellsville fungus, that has been all around in that neighborhood, southwestern Pennsylvania and eastern Ohio.

The Chairman: Is the Connellsville fungus also *diaporthe parasitica*?

Mr. Pierce: Yes, sir. It was placed by Mr. Anderson, who

did the work on that, in the same genus as diaporthe, but he preferred the name *endothia parasitica.*

The Chairman: The question is of changing the generic name, from *diaporthe,* on the basis of the previously established species ?

Mr. Pierce: Yes, sir, previously established species of *endothia.* It is only a suggestion of Mr. Anderson; it was made by him. This was very similar to the true blight fungus and when our men first went out into the western part of the State, they reported these various cases that came up there as chestnut blight, and none of the pathologists of our force then were competent to determine the difference, except that the fact was noted even then that it was not growing as a parasite in the sense that the true blight fungus has been growing in the east.

The Chairman: That may be due to varietal differences, though, rather than specific ?

Mr. Pierce: Yes, although Mr. Anderson seemed to think it was specific.

The Chairman: Is there any further discussion ? The subject is worthy of a good deal of comment.

Mr. Pomeroy: I want to ask the speaker what the approximate cost would be for one spraying of a tree about that size, 70 feet in height ?

Mr. Pierce: We have photographs on the table there showing our eight hundred dollar spraying machine, the same kind used in Massachusetts in gypsy moth work. With this two men can spray about ten such trees in a day. I haven't got it down in black and white but I figured that, on those chestnuts at DuPont's, they sprayed about 600 gallons a day. Ten trees a day would make it, say, with a $2.50 man, not very high for a tree. I think it costs in all something like four dollars a tree during the whole season, but that is a very rough estimate and the materials are not included.

The Chairman: The cost will have to be calculated on a sentimental basis for the ornamental trees, and on a commercial basis for the commercial trees. The actual value of the spraying has not yet been determined. This spraying cannot reach the mycelium in the cambium layer; if the disease has been carried in by a beetle or woodpecker your spraying would be ineffective.

Mr. Pierce: Yes indeed, that was just the thought Mr. Galena had, notwithstanding the fact that they cut out all visi-

ble infections and the trees were so blue with spray that you could see them for half a mile.

The Chairman: But, later on, cracks and squirrel scratches and all sorts of injuries would allow new spores to be carried in?

Mr. Pierce: Yes, sir.

Mr. Reed: The future of the chestnut depends so largely on the conquering of this disease that no other horticultural problem of this nut is, just at present, imperative. So far as we know, all of the European and American varieties are highly subject to this disease, so much so that there is no inducement to plant them, and we are waiting for Dr. Morris and a few other hybridizers to find some hybrids, or straight Japanese varieties, that are of sufficient merit, and of sufficient degree of resistance to this disease, for us to have a basis for building up the future industry. On the tables there are quite a number of exhibits from Mr. Riehl and Mr. Endicott of Illinios. Most of them are hybrids between the American and the Japanese species, but, so far as we know, they have not been tried in communities where the disease prevails. We don't know whether they are resistant or not, as they are being grown in a section entirely outside of the area where the blight exists. I think I am right in that, am I not, Mr. Pierce ? Is there any chestnut blight in southern Illinois ?

Mr. Pierce: There has been none reported.

Mr. Reed: I think that the varieties that these men in Indiana have originated are the most promising we know of. I think that in examining these specimens you will agree that they are of fairly high quality and good size, and if they prove to be resistant to the disease much may be expected from them.

Mr. Hutt: I have not seen the chestnut blight at all. I hope that it isn't in our section. I have heard it was brought in from some point but I do not know whether it was identified exactly as the chestnut blight.

Mr. Pierce: I saw a specimen sent from North Carolina and it proved to be the Collinsville fungus.

Mr. Corsan: If you remember reading Fuller's book on nuts, he reported that the chestnut blight extended through the Carolinas but said that chestnuts were still coming from that direction in great abundance. Up in Canada we haven't the chestnut blight. The chestnut tree runs from the Ohio River to the Niagara River but it doesn't cross into Michigan, except along the Michigan Southern and Lake Shore Railroad where

some enterprising gentlemen have planted the chestnut with the tamarack alternately all the way from Cleveland to Chicago. I examined the state of Indiana across and from top to bottom several times in the summer and I never saw any chestnuts there, but I have seen some newly planted places in Michigan; near Battle Creek I saw a farm of about fifty acres. We are having up in Ontario, beyond Toronto, a blight that has attacked the Lombardy poplar and that looks similar to the chestnut blight. I have been watching it for the last ten years and the tree seems to have at last outlived it. It dies down and then a little sprout comes out from the carcass.

The Chairman: Isn't that the poplar tree borer that always attacks the Lombardy ?

Mr. Corsan: Oh no, it's very similar to the chestnut tree blight. We can grow chestnut trees all we like but no one has brains enough to grow them. The farmers grow pigs and things but don't bother with chestnut trees; consequently the chestnut blight does not exist there.

Mr. Pierce: I didn't answer a portion of Mr. Littlepage's question. Mr. Littlepage asked whether or not the blight might be expected in the Middle West. That depends, more or less, upon the results of the work Pennsylvania is now carrying on. If we can keep the disease from extending through the territory in which we are working, there is a very good chance to keep it out of the West. If we are not successful, it may be expected to develop, in time, over the whole chestnut range.

There seems to be a very good opportunity for growing the chestnut commercially beyond its present range; that is, where it is so infrequent as not to be in danger from infected growths nearby.

In the eastern part of the state different people have reported that the blight seemed to them to be dying out and, a number of these reports coming from a certain locality, the Commission decided to investigate one which seemed to be better reported than the others. It was found, after a very extensive investigation, that this dying out was true only in the sense that it was not spreading, perhaps, as fast as it had been spreading before. The mycelium and the spores were healthy and were affecting the new trees in quite the same manner as the year before and as in other parts of the state.

The Chairman: The question of controlling blight after it has appeared is of very great consequence. Concerning any

commercial proposition with chestnuts the people are wide awake to the seriousness of the blight. They are afraid to go into growing chestnut orchards; they have had so many fake propositions in the past in pecan promotions that they are afraid of chestnuts and everything else. Any proposition for bringing forward chestnuts commercially must be a plain, simple, straightforward statement of the truth, the whole truth and nothing but the truth. We are ready, all through the North and East, to raise hundreds of acres of chestnuts, such as Mr. Reed has spoken about, ones which resist the blight, or ones which resist the blight comparatively well.

Let us consider comparative immunity for a moment. We know how expensive it is to manage an apple orchard, and yet, with the present high prices, the profits on apple orchards, well managed, are great. May we not have chestnut orchards managed with the same degree of relative expense and the same degree of relative profit ? I would like very much to hear from some of the men who have actually raised chestnuts in orchards concerning the relative care of the chestnut compared with the apple, and the relative profit. I see Col. Sober here; can't you tell us about your experience in managing the blight ? Can it be managed successfully in proportion as apple tree parasites are managed ?

Col. Sober: My experience has been this; I have four hundred acres of chestnuts in bearing. They range from five years to fifteen years old. I find that I can control the blight easier than I can control the scale on apple trees. If anyone doesn't believe this I invite him and all to come to my place and see for themselves. I think I have nearly one million seedling and grafted paragon trees. I don't think you will find fifty affected trees on the whole place today. I have men going in every grove at the present time who have inspected thousands of trees and found seven that had blight on the limbs, so I know what I am speaking about.

The Chairman: What is your method ?

Col. Sober: Cutting out, cutting off anything I see; if it is really necessary, cut the tree down; but we don't often find that necessary because just as quick as we see any affected, or any limb dying or dead, we cut it off. I had my groves laid out in sections of a hundred feet wide and numbered; and I had charts made so that they can be inspected section by section. In that manner, every tree is inspected. One individual

will inspect the trunk and another one the top. In each section I can show you as far as we have gone. I can show you how many trees are in each section and how many affected trees three are in that section, or whether there are any or not. I say I can control it easier than I can control scale and with less expense and I want that to go on record. There is no question about it. It can be seen at my place. I go over my groves about four times a year and have been doing it all the time, and I don't doubt but that I discovered this disease the first of anybody in the state, perhaps, in 1902. I was looking around to cut scions and I saw one tree whose center was dead and around it were the finest shoots almost that I had ever seen for grafting purposes. I went to it and saw the center was dead. I cut some scions and today that is one of the finest trees I've got on my place. From what I know now that was a blighted tree.

A member: Did you paint over the scars ?

Col. Sober: No sir, but we are doing it now, using white lead.

A member: How much blight is there around you ?

Col. Sober: I am surrounded with it on all sides. Right up against my groves about 17 per cent of the trees are affected. That is the report coming from the parties inspecting now for the Blight Commission. I shipped Mr. Mayo about four or five thousand trees this fall. I don't suppose there were a dozen that were thrown out, thinking they were blighted or diseased. We have records of all that up at my place. There are some trees right here now that came from my nursery. I wish you gentlemen could just see for yourselves; come out and see.

The Chairman: In advancing this chestnut on a commercial basis it had better be stated that it does not blight as badly as the American chestnut and that when blighted it can be cared for with less cost than the apple tree. I would suggest that some such notice be sent out with commercial stock. That would put it on the right basis so that the chestnut would find its position, which it is not finding now because the people are full of the blight; and if a frank, full statement of this sort were made I believe it would be extremely important.

Mr. Rockey: I went through practically the whole extent of Mr. Sober's orchard recently and found one infected tree. I can vouch for the statement that he has made that he is almost surrounded by blight.

The Chairman: I have given attention to only a few of my

own trees that were blighted because I have too much else to do and too large a place, a couple of hundred acres engaged in a small and large way,—a variety of ways—with nut trees; and the few I have cared to save after blight has begun I have saved by cutting it out very thoroughly and using either white paint or grafting wax. I used also pine tar and some gas tar. I killed some good trees that I wanted particularly to save by putting on gas tar.

The matter of compelling the removal of infected trees is a very important one, but it must rest with the authorities. In the vicinity of New York we have so much hard wood that you cannot sell it unless you are in some sort of a trade combination. Fine oak, fine hickory, fine chestnut, you can't dispose of in New York City, because we have such a lot of it. We have wild deer within fifteen miles of New York City on three sides of us on account of the forests. You have got to find some special way for disposing of this blighted chestnut timber. Telephone and telegraph poles and ties all go for nothing, unless you happen to be so situated that you can manage the matter commercially, and a way should be found by the state so that people can dispose of their blighted timber, which is just as good as any other.

It is very important to note that the boy scouts are interested, and we ought to encourage their interest. It is a splendid thing, getting the interest of boys engaged. You know how active a boy is in getting a snake from under a rock and he will do the same thing with the chestnut blight. It is his natural tendency to hustle when he gets after anything. This chestnut blight belongs to the microbe group and the microbe is the great enemy of mankind. In wars the microbe kills about eight men for every one killed by missiles. If we can encourage the interest of boy scouts in fighting the greatest of all human enemies, the microbe, including this little fungus, we shall have a splendid working force.

In regard to the injection of poisons and medicines into trees, it seems to me that a very firm stand ought to be taken by all responsible men who know anything about plant pathology. We know that a poison injected into a tree must either act injuriously right there upon the cells of the tree, or else must undergo metabolic changes. A tree cannot use anything that is thrown into it, poison or food or anything else, until it has undergone a metabolic change; you must have a distinct, definite chemical process taking place and we ought to state that most of the

substances which are alleged to be of value, when injected into a tree, are either absolutely worthless or injurious. One man tried to persuade me that his medication if applied to the cambium layer would be absorbed, and said that if I would only use it on a few of my trees I could see for myself. He said it would drive off even the aphides. I tried it on four trees affected with aphides and found that he told me the truth. It drove them off, because the trees died and the aphides left. One tree lived a year before being killed; it was a most insidious sort of death, but the aphides left that tree. (Laughter.)

Some of the Asiatic chestnuts resist the blight very well. Curiously enough when grafted upon some of the American chestnuts they then become vulnerable. Two years ago, from a lot of about one thousand Corean chestnuts in which there had been up to that time no blight, I grafted scions on American stump sprouts and about 50 per cent of those grafts blighted in the next year, showing that the American chestnut sap offers a pabulum attractive to the Diaporthe, and that is a fact of collateral value in getting our negative testimony upon the point.

Concerning the question of carrying blight fifty miles, there's no telling how far birds will fly carrying the spores of Diaporthe upon their feet. The spores are viscid and adhere to the feet of beetles, or migratory birds which sometimes make long lateral flights following food, rather than direct flights north and south. It is quite easy to imagine birds carrying this Diaporthe over an interval of possibly fifty miles, making that distance in one night perhaps. Someone may have carried chestnuts in his pocket to give to his granddaughter fifty miles away, and in that way carried the blight. If any grafted trees have been carried fifty miles, or any railroad ties, with a little bark on, carried fifty miles and then thrown off, it might blight the chestnuts in that vicinity. One can have as much range of imagination as he pleases as Longfellow says, There is no limit to the imagination in connection with questions of spreading the blight of Diaporthe.

Some of the Japanese and Corean chestnuts and some of the Chinese chestnuts resist blight fairly well. Among my chinkapins, I have the common *pumila* and the Missouri variety of *pumila*, which grows in tree form forty or fifty feet high. I have the alder-leaf chestnut, which keeps green leaves till Christmas, sometimes till March when the snow buries them, and

those comparatively young trees have shown no blight; but one hybrid, between the chinkapin and the American chestnut, about twelve years of age, has blighted several times. I have cut off the branches and kept it going, but this year I shall cut it down. It will start at the root and sprout up again. I thought I'd give up that hybrid, but having heard Col. Sober's report I will begin at the root and look after some of the sprouts. That hybrid is the only one of my chinkapin group that has blighted at all.

In regard to the use of bichloride of mercury or formaldehyde, it seems to me that formaldehyde will be a better germicide than bichloride of mercury, because bichloride of mercury coagulates the albuminous part of the plasm and may destroy the cell structure, whereas the formaldehyde will be more penetrating and less injurious. One would need to know how strong a formaldehyde solution can be used safely. I presume the most vulnerable part of the tree would be at the bud axils. Spraying must require considerable experience at the present time and is of doubtful efficiency for timber chestnuts I am sure. We would like very much to hear any further comment upon this subject.

Prof. Smith: Mr. Sober's orchard is so unusually large that evidently it does not apply to average cases. The average man is buying chestnut trees for the garden or yard or lane. Prof. Collins has an acre on the top of a hill at Atlantic Forge and there he has fought diligently with the skill of a highly trained man, and the blight is gradually driving him back. I think that in a short time the trees on Prof. Collins' acre will be gone. I believe we need much more information before we can offer any hope that chestnut trees from a nursery will be safe against blight. I should like to ask the Blight Commission if they are at the present time planning to breed immune strains of chestnuts, and if not, I wish to suggest that it is a piece of work well worthy of their consideration. They might try grafting on American stocks, or on their own seedlings, some of the Korean chestnuts, on any variety that promises resistance, and also hybridizing, with the hope of getting a good nut that will resist the blight.

The Chairman: That is a very important matter, no doubt. In regard to the few chestnuts bought for lanes and gardens, I know a good many men who have bought a few grafted chestnuts with the idea of setting out a number of acres if those few did well, being men of a conservative sort. Men of that sort are

the ones we want to have in our Association. We want to have men who will buy four trees, and if they do well, set out four hundred acres. That is what a great many men have had in mind in buying two, four or six trees of any one kind; they want to try them out. That is the wise way, the conservative way, the truly progressive way. If we are going to have very large numbers of any one kind of chestnut set out, we must make a statement of the dangers, so that men may be forewarned. If they set them out without warning and are disappointed, they drop the entire subject and go to raising corn and hogs; and then, to save trouble, turn these hogs into the corn and get to doing things in the easiest way, rather than carry on the complicated methods of agriculture that belong to the spirit of the present time. I would like to know if many efforts are being made toward breeding immune kinds. I am at work on that myself.

Mr. Pierce: Our Commission has recently gotten, I think, about fifty pounds of Chinese chestnuts of several kinds, which they expect to plant for experiment. Besides that they have made some other arrangements of which I know very little. This investigation will take years. The Commission has been compelled to devote itself to so many lines of work that I am afraid this question has not been given the attention it might have had. I think in the future there will be a good deal done along that line.

Two of us have been given the title of tree surgeons, and we work, or make arrangements to have someone else work, sometimes the scout, in the orchards throughout the state. I have a list of two hundred owners of cultivated chestnut trees that I got in the last month from various sources. Anyone in Pennsylvania who has a cultivated chestnut tree, can send a postal card, get one of us out to examine the tree and see whether it is blighted, and we will demonstrate what can be done in the way of treating it. I have done that right along in the last two months. If it is only a single tree I cut out all I can myself.

The Chairman: There are two distinct questions; first, the chestnut as a food tree, and second, as a timber tree. Your work has been chiefly with the chestnut as a timber tree ?

Mr. Pierce: No, mine has been mostly on the lawn, so that it is for nuts.

Experiments made on one or two species of Japanese chestnuts show about 9 per cent of tannin; the tannin in the Ameri-

can chestnut runs only 6 per cent and in the small American, runs less. We know that the Japanese is somewhat more immune than the American. We have already found that it has 50 per cent more tannin. I believe one of us wrote you about experiments to find out the percentage of tannin in Corean, North Japanese, South Japanese and Chinese chestnuts. The investigation will be carried on for the next two or three months.

Mr. Corsan: May I ask if there is any soil food that would increase the amount of tannin ? Trees protect themselves. We have watched the black walnut and seen him fight all sorts of enemies. The tree has poisons everywhere and the nut a thick shell to boot and doesn't coax enemies to get at him or to eat him until he is ripe.

A Member: Have you found that fertilizing a tree increased the percentage of tannin ?

Mr. Rockey: That hasn't been determined yet but it will be studied.

The Chairman: It is a question if the tendency would not be for tannin to go over to sugar and cellulose under cultivation. I don't remember the chemistry on that. Aren't there any expert chemists here who can tell us ? The natural tendency of the tree under high cultivation would be to change tannin over into sugar and starch.

Mr. Corsan: This talk of the chestnut blight reminds me of a remark made by a gentleman at a peach growing convention. He said the best thing that ever happened to this country was to get that San Jose scale because it stopped lazy men from growing peaches. He said, "I don't mind it a bit and can make more money than when peaches were nothing a basket." Probably nature will help us some way.

The Chairman: We have to consider what nature wants to do.

Mr. Mayo: If I am in order, I would like to know whether this fungus trouble is likely in the future to attack or has at any time attacked, the apple, pear or quince ?

The Chairman: I think it has been pretty well decided that they are not in danger. I will, however, ask Mr. Rockey and Mr. Pierce to answer that question.

Mr. Rockey: Up to the present time there has been no indication that the blight will get into them. This might be a good occasion for me to mention the Connellsville fungus again. It was found on some of the oaks and other trees in this section

of the country, and for a time it looked as though the blight was getting into other species, but since that fungus has been identified there has been no indication that the blight will extend beyond the chestnut group as a parasite, although you can inoculate oaks and other trees with the fungus and it will live in them, but only on the dead portion of the tree and not as the parasite lives on the chestnut.

Prof. Smith: I should like to ask Mr. Sober if he has found any evidence that the paragon chestnut differs from the native chestnut in resistance to the blight, and if his paragons are different from other paragons ?

Col. Sober: I cannot say whether my chestnuts are different from the other paragon chestnuts or not, or whether they are as resistant to the blight. I know it is a very sweet chestnut. In regard to keeping my groves clean—from 1901 to 1910, we had three broods of locusts and two hailstorms that opened the bark in almost every tree and branch. The limbs were stung by the locusts thousands of times, so that I didn't have a crop of chestnuts. Professor Davis was cutting off limbs for a couple of months so you see my trees were open, if any ever were, to receive the blight. The hailstorms destroyed the leaves and I didn't have any chestnuts that year in one part of my grove and with all that—you people come and see how clean it is, that's all there is to it. I know what I've done and what I can do.

The Chairman: The next paper in order is that of Professor Smith.

NUT GROWING AND TREE BREEDING AND THEIR RELATION TO CONSERVATION

PROFESSOR J. RUSSELL SMITH, PENNSYLVANIA

Prof. Smith: Mr. Chairman, ladies and gentlemen; I am going to ask your indulgence for including in my subject a matter that perhaps goes a little beyond the scope of this organization, for I wish to speak of fruit as well as nut-bearing trees. Conservation, whose object is the preservation of our resources for future generations, as well as for ourselves, finds its greatest problem in the preservation of the soil. The forests can come again if the soil be left. It is probable that we can find substitutes for coal, and for nearly everything else, but once the

soil is gone, all is gone; and the greatest danger to the soil is not robbery by ill cropping, because no matter how man may abuse the soil, scientific agriculture can bring it back with astonishing speed. But the greatest enemy of conservation is erosion, the best checks for erosion are roots.

Thus far, the only man who has been telling us anything about planting roots upon the hillsides is the forester. But he usually sets nothing but wood trees, which at the end of fifty or a hundred or a hundred and fifty years, we can cut down, and which, during the intervening time, have done nothing but cast shade, drop leaves and retain the soil. My doctrine is that the potentially greatest crop-producing plants are not those on which we now depend for our food, but are the trees,; that the greatest engines for production are not the grasses, but the trees. Our agriculture is an inheritance from the savage, and the savage found that he could do better with annual grains than he could with nut trees, because he didn't know how to improve the nut crop by selection of the trees, while there came involuntarily an improvement in the other crops. No man today knows the parentage of some of the cultivated plants and grains on which we now depend. Thus we came down to the present day of science, with the purely chance discoveries of savages as the main dependence of mankind for the basis of agriculture.

We have within a decade discovered the laws of plant breeding. We know a good deal more about it now than ever before and are in a position to start about it very deliberately and with a reasonable certainty that we are going to get certain combinations of qualities if we keep at it long enough. Thus the hickory and walnut offer perfect marvels of possibilities. Look around on these tables and see the size of some of these things. There are hickory nuts 1 1-4 inch long and there are shagbarks as full of meat as pecans and probably quite as good. There are in Kentucky, I am told, hickory nuts that you can take in your fingers and crush. Here we have the pecan, this great big shellbark from Indiana, the shagbark from the North, and the thin shell nuts from Kentucky. Now hybridize these and I think, if you work at it long enough, you will get a tree that will have all those good qualities.

The wonderful black walnut is a tree of hardiness, and the delicious Persian or English walnut is a nut of acceptable form. The pair offers splendid possibilities in their hybrid progeny.

We have fruits thus far recognized as of little value which

offer great possibilities as forage producers. The mulberry bears from June to September and the persimmon from September till March and the pig harvests them himself.

We have the possibility of a brand-new agriculture, depending not upon grains, but upon tree crops, provided someone will breed the crop-yielding trees which we can use. This will permit us to use entirely different kinds of land from that now considered best for agriculture. The natural necessities for plant growth, I believe, are heat, moisture, sunlight and fertility. Now they are not all the limiting factors with man, because man adds the fifth, the arbitrary fact of arability, and that right away bars out about half of the fertile earth, because when we insist on heat, light, moisture, fertility *and arability*, we leave out that rough half of the earth equally fertile, idle, subject only to the work of the forester, who will give us a forest about 1999. It might just as well be planted with a host of crop-yielding trees, the walnuts, hickory nuts, pecans, persimmons, mulberries—and the list is very long. There are at the present time in use in Mediterranean countries twenty-five crop-yielding trees other than the ordinary orchard fruits. I am told that they have oak trees there which yield an acorn that is better than the chestnut. A pig will fill himself with acorns on the one hillside and with figs on the next hillside and then lie down and get fat. We are too industrious, we wait on the pig; I want the pig to wait on himself.

But who is going to breed these things? These crop yielding trees? A gentleman told us this morning that he was not nervous, that he could watch a hickory tree grow, and stated that he had forty acres of land and was breeding trees for fun. Here is Dr. Morris, who is having a delicious time doing the same thing. We should not have to depend on enthusiasts who are working for fun; we must not depend on such sources for the greatest gifts in the line of food production that man can imagine. This work should be done by every state in the Union. I believe that it is capable of proof that we can get just as much yield from a hillside in untilled fruit and nut-yielding trees, as we can from putting that same hillside under the plough and getting wheat, corn, barley, rye and oats and a little grass once in a while. It will make just as much pig or just as many calories of man food from the tree crops as it will make under the plough. And under the plough that hillside is going down the stream to choke it and reduce the hillside to nothing.

We have three classes of land. The first class is the level land, which belongs to the plough now and for all time. The third class, which is the unploughable steep mountain and hill land, is probably as great in area as the level land, and between the two is the hilly land that we are now cultivating to its great detriment, visibly reducing the earth's resources by bringing about rapidly that condition which has led to the saying in the Old World: "After man, the desert." The Roman Empire, where men have had possession for two thousand years, proves, "After man, the desert." It is equally proven in much of China, but it can be prevented if these hill lands are put to trees. But we cannot afford to put those lands into trees unless the trees yield.

I move that this Association memorialize those persons who are in position to promote the breeding of fruit and nut-yielding trees, that we may bring nearer the day of tree-crop agriculture. I want a letter to go from this Association with the authority of the Association and its sanction, to the Secretary of Agriculture at Washington and to all the men in authority in the Bureau of Plant Industry at Washington, to the Presidents of the State Agricultural Colleges, the Directors of Experiment Stations and professors who are interested in plant breeding. That will make a list of three or four hundred persons and involve an expenditure of a few dollars but I believe it will be productive of good. I hope that the Association will see fit to lend its name and a little cash to that proposition, because if we can get the authority of the state and the money of the state, the results will come much more rapidly than if there are just a few of us doing it independently. (Applause.)

The Chairman: Will someone put Prof. Smith's suggestion in the form of a motion ?

A Member: I move that it be referred to the Committee on Resolutions.

(Motion carried.)

Mr. Corsan: Undoubtedly we all agree with Prof. Smith. He spoke of the persimmon. When I speak of the persimmon in my country nobody knows what I am talking about. I found two trees in Battle Creek, Michigan, in a front yard. The person who owned them was an old lady. I said, "Will you give me these persimmons?" She said, "Yes, take them all; the neighbors come here and while they are getting the persimmons they bother me a lot. Everybody seems to like them." They

were delicious persimmons that were quite edible before frost, they are probably the two furthest north persimmon trees in the world. I went a little way around Devil Lake, and found pawpaws. They are a very good fruit when cultivated. The idea of preserving the soil and not sending it all into the Lakes and down into the Gulf of Mexico—that is a good idea of Prof. Smith's.

Mr. Gardner: I submit that that Battle Creek woman should start a new breakfast food. (Laughter.)

Mr. Corsan: Every second year there is an immense crop on one of the persimmon trees; they are a male and female, I think. You can't see the branches for the fruit, and the thermometer there falls to 22 degrees below zero.

The Chairman: You can graft the male trees with pistillate grafts if you want to, or you can transfer grafts both ways. The persimmon and pawpaw will undoubtedly both grow at Toronto. They are not indigenous there because of natural checks to development in their sprouting stage, but if you buy Indiana stock for Toronto, such transplanted trees will both grow there, I am sure. This is not quite relevant to Prof. Smith's paper. It seems to me that Prof. Smith gave us a very comprehensive resumé of facts bearing upon the situation, perhaps not particularly calling for discussion. We are very glad to have his arraignment of facts.

The next paper on the program will be that of Dr. Deming. While Dr. Deming is getting ready, I would like to have the trees shown. Mr. Jones will speak about his pecans, these specimens of young trees here.

Mr. Jones: These are pecans that Mr. Roper brought up from the Arrowfield Nurseries. (Here Mr. Jones described the trees.)

The Chairman: Would those trees grow after they have been dried as much as that ?

Mr. Jones: I don't think so; pecans don't stand much drying.

The Chairman: No, unless you cut off all the roots.

Prof. Smith: If we should dig up a tree like this and cut it off a foot and a half down, would it be all right to transplant it?

Mr. Jones: Yes, if your season should not be too dry.

The Chairman: What has been your experience with the Stringfellow method of cutting off every single root ?

Mr. Jones: We cut the tap-roots off, but leave an inch of the lateral roots.

The Chairman: I think you can do better by following the Stringfellow method and cutting off all the laterals.

Prof. Smith: If you were going to transplant those for your own use where would you cut them off ?

Mr. Jones: About here, a foot and a half down.

The Secretary: And the top ?

Mr. Jones: Yes, sir, I'd reduce the top about that much; I think we will have to work for a better root for the North.

BEGINNING WITH NUTS

Dr. W. C. Deming, Westchester, New York City

In his official capacity as secretary of the Northern Nut Growers Association the writer is frequently asked, by persons wishing to grow nuts, about climate, soils, varieties and methods.

The following observations are intended to apply only to the northeastern United States, the country lying east of the Rockies and north of the range of the southern pecan. They are intended more for the person who already has his land, or is restricted in his range, than for the one who can range wide for larger operations and will study deeper before deciding.

It is probable that most nuts will grow wherever the peach will. Outside the peach area there is probably not much use in trying to grow the pecan or Persian walnut. Yet it must always be remembered that nut growing in the North is, at present, almost entirely experimental and that anybody may be able to disprove the authorities. We are all experimenting now. By and by it will be different.

In severer climates the chestnut, shagbark, black walnut, butternut, hazel, beech, pine, Japanese cordiformis and hardy Chinese walnuts can be grown or, at least, offer possibilities. In such climates the development of the native nuts by selection and crossing, and the adaptation of alien nuts, deserves, and will repay, experiment.

It is to be supposed, as before said, that the hopeful beginner already has his land. Let him choose the best part of it that he can spare. By "best part" is meant the most fertile, not too wet nor too dry nor, if possible, too hilly to cultivate. Hard pan near the surface, and too thick to be easily broken up by dynamite, is not desirable.

A nut orchard ought to have much the same preparation as an apple orchard. A practical way would be to plow deeply and harrow well in summer and sow a cover crop like rye and vetch or clover. The more stable manure, or other fertilizer, applied the better.

Let the field now be staked off thirty feet apart in squares, or in triangles if preferred. Late in the fall dig the holes and plant nuts, three or four in each hole, two to four inches deep, according to size, and six inches apart. Put a good handful of ground bone in each hill. Unless the soil and subsoil are mellow, so that the long tap roots may penetrate deeply, it would be best to dynamite the holes, using a half pound of 20 per cent or 25 per cent dynamite at a depth of two and a half feet. This is a simple matter and the dynamite companies will furnish materials and instructions. It is also some fun.

There is some danger that nuts planted in fall may be destroyed by rodents, that some will "lie over" and not sprout the first year, or that all the nuts in a hill may make inferior plants, so that some authorities advise putting them in a galvanized wire cage, the nuts only half buried, then covered with a few leaves during the winter and otherwise left exposed to the elements. In the spring they must be taken from the cage and planted in the hills before the sprouts are long enough to be easily broken.

The different kinds of nuts should be planted in "blocks" rather than mingled, to facilitate handling.

These nuts are to furnish trees that are later to be grafted or budded. After they have grown a while the weaker ones are to be removed, as necessary, until only the strongest remains in each hill. When grafted and grown to great size the brave man will thin them out to sixty feet apart. Interplanting with fruits or vegetables may be practised.

As to the kinds of nuts to be planted that depends on what you want to grow. If chestnuts it must be remembered that the bark disease is very likely to attack them, in the East at any rate. Experiments with chestnuts outside the range of the blight are very desirable. The American (*Castanea dentata*) and European (*C. sativa*) chestnuts are specially susceptible. The Asiatic chestnuts (*C. Japonica*, etc.) seem to have a partial immunity, especially the Korean, and it is possible that the native chestnut grafted on these may be rendered more or less immune. It is being tried and is an interesting experiment.

The Asiatic chestnut trees are dwarfish in habit, come into bearing early, the nuts are generally large and some of them of pretty good quality. They may be planted as fillers between the trees of larger growth. The nuts may be bought of importers. (See circular on "Seedsmen and Nurserymen".) The small Korean chestnut has been especially recommended.

If you wish to grow the shagbark hickory (*Hicoria ovata*) plant the best specimens of this nut you can get, or the bitternut (*H. minima*) which is said to be a superior stock for grafting.

High hopes are held that that other favorite hickory, the pecan (*H. pecan*) may be grown far outside its native range, and the Indiana pecan is the nut on which these hopes are founded. Seed nuts may be obtained from reliable Indiana dealers, but it is said that some of them are not reliable.

The hickories may be budded and grafted on one another so that one kind of stock may serve for both shagbark and pecan.

If you want to grow the Persian walnut (*Juglans regia*), often called the "English" walnut, the black walnut (*J. nigra*), seems to afford the most promising stock, though *J. rupestris*, native in Texas and Arizona, has been recommended and *J. cordiformis*, the Japanese heart nut, is also promising. This nut can be recommended for planting for its own sake as the tree is hardy, a rapid grower, comes into bearing early and bears a fairly good nut. There are no grafted trees, however, so the variable seedlings will have to be depended upon.

On any of these walnut stocks the black walnut and the butternut (*J. cinerea*) may also be propagated if worthy varieties can be found. There are none now on the market.

The nuts mentioned are enough for the beginner and the three stocks, chestnut, hickory and walnut, will give him all he wants to work on and furnish plenty of fascinating occupation.

The hazel, the almond and others, though offering possibilities, had better be left to those further advanced in the art of nut growing.

Now the nut orchard is started and the owner must push the growth of the trees by the ordinary methods, cultivation, cover crops and fertilizers. See any authority on growing fruit trees.

In from two to five years the trees will be ready for budding and grafting, they will have made a good growth above ground, and a bigger one below, they are permanently placed and haven't got to be set back a year or two, or perhaps killed,

by transplanting, with loss to the tap roots and laterals. In the writer's opinion that natural tap root of the nut tree growing down, down to water is not to be treated as of no importance.

So let your seedlings grow up and down happily while you get ready the stuff with which to build their future character, for seedling trees are very slow in coming into bearing, and uncertain in type and quality of nut. Grafted trees bear early and true to type.

Take your choicest bit of ground and put it in the best shape you know how. Then order the finest grafted trees you can find on the market. (See circular on "Seedsmen and Nurserymen".) Your choice will be limited for there are as yet only a few grafted varieties of the Persian walnut and the Indiana pecan, and but one of the shagbark hickory to be had. Of chestnuts there are more and, in the South of course, plenty of pecans. But pecan growing in the South is another story. If you order chestnuts be sure that they do not come from a nursery infected with blight. Get young trees because they are more easily established.

Order from two to four of each variety. Fewer than two gives too small an allowance for mortality and more than four, besides the not inconsiderable strain on the pocket, will divide your attention too much; for you have got to give these trees the care of a bottle baby.

Set them sixty feet apart if you have the room. If not set them closer. Better closer if that means better care. They may be set in the fall but probably spring is better, as early as you can get them in. Follow the instructions of the nurserymen closely. Digging holes with dynamite is probably good practice. Put some bone meal in the soil around the roots but no strong fertilizer. Some soils need lime. Tamp the soil about the roots with all your might. It cannot be made too firm.

Then water them all summer, or until August if they have made a good growth. Give them all they can drink once a week. Sink a large bar about a foot from the tree and pour the water into the hole, as much as the soil will take.

Keep up cultivation and a dust mulch or, if you cannot do this, mulch with something else. Mulching doesn't mean a wisp of hay but something thick or impervious. Six inches of strawy manure, grass, vines or weeds; an old carpet, burlap, feed or fertilizer bags or even newspapers, held down with stones or weeds or earth, all make good mulches.

These trees ought to grow and, whether you ever succeed in grafting your seedlings or not, you should have at least a small orchard of fine nut trees.

The second summer with the trees will be something like the baby's. Worms may bother them. Look out for bud worms and leaf-eating caterpillars. Give them all the water they can drink in the dry dog days. Nurse them, feed them and watch them and they will grow up to bless you. Some of them may bear as early as apple trees.

These trees, and such scions as, from time to time, you may obtain elsewhere, are to furnish your propagating material.

The plan just described may be modified in various ways, but the general principles are the same. Instead of planting the nuts in their permanent positions they may be put in nursery rows where they may have the advantage of intensive cultivation. The best of the resulting trees may be grafted or budded in the rows, or after they have been transplanted and have become well established. This method is an excellent one and has distinct advantages and many advocates.

Yearling seedlings may be bought and set either in permanent positions or in nursery rows.

Of course the man who is in a hurry, who can disregard expense and who does not care for the experience and gratification of grafting his own trees, may set his whole plantation with expensive grafted trees and replant where they fail.

The technique of budding and grafting you must work out yourself with the help of the instructions obtainable from several authorities, or, by far the surer way, study the art with a master. The essentials are good stocks and good scions, the right moment—and practice.

Excellent publications giving instructions in methods of propagation are: "The Persian Walnut Industry in the United States," by E. R. Lake; Bulletin 254, Bureau of Plant Industry, U. S. Department of Agriculture, 1913: "The Pecan," by C. A. Reed; Bulletin 251 of the same department, 1912: "Walnut Growing in Oregon," published by the Passenger Department Southern Pacific Company Lines in Oregon, Portland, Oregon, revised edition, 1912; and "Nut Growing in Maryland," by C. P. Close; Bulletin 125 of the Maryland Agricultural Experiment Station, College Park, Maryland. Any of these may be had free on application.

The files and current issues of the nut journals are full of

information. Join the nut growers associations, subscribe to the nut journals, get all the literature (see Circular No. 3) and you will soon be happily out of the fledgeling stage of nut growing and begin to do as you please.

The Chairman: Comment upon this paper is now in order.

Mr. Lake: You say you are going to issue that ?

The Secretary: On my own responsibility, but subject to modification.

Mr. Lake: If that is going out as a circular of the association, I would like to suggest two slight changes. For instance, you wouldn't expect the ordinary nut tree to begin to bear as early as the ordinary transplanted apple tree.

The Chairman: Some would.

Mr. Lake: A summer apple would begin to bear much earlier than the ordinary nut tree.

The Secretary: Well, chestnuts begin to bear very early after grafting. I refer only to grafted trees here.

Mr. Lake: I thought that the paper had to do with trees that were planted as nuts.

The Secretary: No, I think I made that perfectly clear.

Mr. Lake: What is that new statement about roots, that it is desirable to leave them ?

The Secretary: That it is better that a tree should go undisturbed than that it should be transplanted.

Mr. Lake: Isn't there a question about that ?

The Secretary: A question would arise in the hands of an expert, perhaps, but I think for an amateur, that a tree growing where the nut was planted is more likely to live and do well than a transplanted tree.

Mr. Lake: I am not so certain about that, but what I had in mind was that the planter would get the idea that the tap-root was not to be cut off and that it is very desirable to the tree.

The Secretary: That's a good point.

The Chairman: About cutting the tap-root I have said yes and no so fast that I don't know which I've said last, and it seems to me that we ought to have discussion on this very point.

The Secretary: I have said that in buying these grafted trees you should set them out following the instructions of the nurseryman closely.

Mr. Lake: But that statement about the tap-root would lead the average planter to think that it was very desirable to have the tap-root.

The Secretary: Has it been setfled that it is not desirable ?

Mr. Lake: Well, I think it has been generally accepted that it is of no special value.

The Secretary: That trees will grow as well transplanted as if they have never been transplanted ?

Mr. Lake: Well, I shouldn't want to put it that way, but this is the point: I would like to have the tree planter understand that a walnut tree doesn't need the tap-root and if he cuts off the tap-root in planting, there is no great loss. I wouldn't want to say that his trees wouldn't begin to bear earlier or bear larger if left in the original place. I prefer to transplant my own tree after it is grown, rather than run the risk of getting scrub trees in the post hole or on the hill. I prefer to select the grafted trees even without the tap-roots, which would be removed in digging, and planting them all uniform, rather than to plant the seeds. Speaking for the amateur, I think the latter is good practice. The point I had in mind was that many people will not take the time to plant nuts but will want to set grafted trees, and the question is, should they have considerable tap-root—the grafted trees ?

The Secretary: Following my plan, a man would buy a small number of fine trees and set them out at once; that would probably be all he would undertake and all he could probably manage. He would also plant a small number of nuts on which to experiment in propagation. My experience up in Connecticut has been that all my southern transplanted trees, almost without exception, have died. I have planted pecans and Persian walnuts from a number of different nurseries. I have done it personally and done it as carefully as I could, but they have either made a very feeble growth indeed or have all died. On the other hand, the seeds I have planted have grown into very vigorous trees.

Mr. Rush: I have had a little experience with the tap-root theory. You can't dig a walnut tree without cutting the tap-root, and that tap-root, I find, is practically of no benefit at all after you have your upper laterals, and an abundance of them; by cutting the tap-root growth is stimulated and a new tap-root is made. It is very largely in the mode of pruning the tap-root. You can readily stimulate the tap-root system.

The Chairman: You try to keep an equilibrium by cutting down the top in proportion ?

Mr. Rush: Yes, sir.

Mr. Pomeroy: In examining transplanted trees I found ten times as many roots where the tap-root had been cut; and there were two tap-roots. I like a tree with a good tap-root system and I am positive that if you transplant a tree you get a better root system, get a great many more roots.

The Chairman: The tree development, it seems to me, depends not upon the number of roots which are carried with it when it is transplanted, but upon the feeding roots which develop. Now, if we cut back the tap-root, cut back the laterals, cut back the top, we have a tree carrying in its cambium layer, food, just as a turnip or beet would carry it—and I look upon a transplanted tree much as a carrot or beet, with stored food ready to make a new root.

Mr. Harris: I planted last fall a year ago a lot of English walnuts. Would the gentleman advise taking those up, cutting the tap-roots and planting them again ?

Mr. Rush: I don't think that would be advisable.

Mr. Harris: They were grown from the nuts sown in a row last fall a year ago and grew very well.

Mr. Rush: In propagating the English walnut we have had them do the best by transplanting when the tree is about two years old, but it will more or less disturb the vigor of a tree to transplant it. That is self-evident; it needs some time to heal those wounds that are made both in the root and the branch.

Mr. Harris: What time of year do you bud them ?

Mr. Rush: In August.

Mr. Hutt: I notice some trees here that are evidently two-year old pecans that have been cut back, and you notice that in every case several tap-roots have taken the place of the one. Here are some others that have not been cut. These have gone straight down. They are strong roots with few fibers on them. On these other trees that have been cut the formation of tap-roots continues. They will go down till they strike a permanent water-table and then the tap-root will stop. In Hyde County, North Carolina, near the ocean, the water-table is close to the surface and there is a deep black alluvial soil with a great deal of water in it. In order to grow anything there they have to put in ditches to get the water out. The pecan trees growing there have absolutely no tap-roots at all, it rots off as soon

as it strikes the permanent water-table; and I think that's the reason they produce such enormous quantities of pecans in that county. In bottomless, sandy land where there is no clay the root keeps on going down till it finds the permanent water-table, even if that is six or eight or ten feet down. These roots, as you see, were going right down to China to look at that king on the other side if they got a chance. It's the same with the long leaf pine. It has a tap-root below ground thicker than the trunk above ground. The reason is that it grows naturally on those bottomless places; the root goes down till it strikes water, then runs off laterally. If you cut the roots they are bound to make new tap-roots. You can see the place where they have been cut and in place of one tap-root you have two, going right down into that sandy soil till they find a water-table. I believe that a nurseryman who will cut off the root of the pecan tree when it is transplanted, will cause it to form more lateral roots and make a better tree. There's a great number of vigorous roots in this tree than in this, and this tree whose root has been cut off will make a tree much easier to transplant and will be a better tree than those with great thick roots without the fibers that have the root hairs upon them.

A member: You wouldn't recommend cutting back that tap-root too severely, would you ?

Mr. Hutt: In planting a tree of this kind, I'd cut off a foot or 18 inches. If you get about 24 inches in a specially good soil, or about 30 inches of root ordinarily that's all you want.

A member: I should think that would depend quite a little on the height of the water-table. If you were planting on land where the water-table is low, you would leave more tap-root ?

Mr. Hutt: Yes.

A member: That was the reason I brought up the point, because I think cutting so short would be too severe.

Mr. Hutt: The cambium is the only part of the tree that maintains growth. Every wound kills the cambium to a certain extent, so I always cut off roots of any size with sharp shears as smoothly as possible. I cut far enough back to find good, fresh, living tissue. In moist soil that will callous over. In the South the soil is moist and we have growing conditions in the winter time, so it will callous over during the winter. In the North, I understand, you make a practice of planting in the spring, because of the weather conditions.

Mr. Harris: In Western Maryland we have in the moun-

tains a deep, sandy soil; there doesn't appear to be any water bottom to it; what would the tap-root do in that case ?

Mr. Hutt: It will go down until it finds what it wants, finds sufficient moisture.

Mr. Harris: Gravelly bottom ?

Mr. Hutt: If you have ever seen the roots of a long leaf pine, you've seen where the roots go to when they get a chance.

Prof. Smith: I should like to ask Dr. Deming if he would give us his experience in propagating the walnut and hickory ?

Dr. Deming: A very important thing indeed for us nut growers in the North is to learn how to propagate. Dr. Morris has had some success; I haven't had any. I have tried it summer and spring, year after year. I believe there are a few pieces of bark, without buds, still growing. Chestnuts I haven't found very difficult, but with the walnut and hickory I have had no success whatever, although I have practiced the best technique I could master. I think one reason why I have had no success is that I haven't had good material. I have had good stocks, but I haven't had good scions, not the sort of scion that the successful southern nurserymen use. Still, Dr. Morris has had success with the same kind of material that I have failed with.

The Chairman: Not very much success.

Mr. Lake: Dr. Deming said that the land ought not to be too dry nor too wet. Would you feel like saying that a water-table at 24 inches was neither too low nor too high ?

Mr. Hutt: It depends a great deal on the nature of the soil, the water-pulling capacity of the soil. Take a soil like that I mentioned, in Hyde County, near the ocean; you can see it quake all around you.

Mr. Lake: But would you say that the northern nut grower might safely put his orchard on soil that had a water-table within two or three feet of the surface ?

Mr. Hutt: I could tell if I saw that soil. If it is craw-fishy, or soil that is ill-drained or won't carry ordinary crops, I'd say keep off of it, but if it will bear ordinary crops it's all right; in some cases where the soil is very rich the plant does not need to go down into that soil anything like the depth it would in a poor soil. The poorer the soil the further the roots have to go to find nourishment.

Mr. Lake: I think that is an extremely exceptional case in relation to northern nuts. There is very little such North Carolina land in this section of the country, if I judge right.

We don't plant nut-growing orchards up here in peaty soils, so Dr. Deming's recommendation was rather for very good agricultural soil. A water-table here must be eight or ten feet deep; in that event, it would not make any difference whether you left three feet of tap-root or 15 inches.

Mr. Hutt: No.

The Chairman: In the soils of some parts of New England, a tree would have to have a root three or four hundred feet deep to get to flowing water, but nevertheless trees flourish there.

Mr. Lake: But the capillarity of the soil provides water for the tree above the water-table.

Mr. Corsan: It all depends on the kind of nut. At St. Geneva I came across a butternut that was growing in a soil that would kill a chestnut very quickly. The soil was very springy and wet and the butternut just loves that soil. I found that while other butternut trees bore nuts in clusters of one to three, this butternut tree was bearing them in clusters of ten and eleven. At Lake George, right in front of the Post-Office, there was one tree twenty-four years old, two feet through, that grew butternuts in clusters of ten and you could get a barrel of nuts from it. It bore again this last summer heavily, not in clusters of ten but in clusters of seven or eight. When we have damp soil we can't grow the chestnut but the hickory nut will grow in a swamp, and so will the butternut.

The Chairman: And the beech.

Mr. Corsan: The beech wants clay; it won't grow unless there is clay.

The Chairman: Our beech will grow where it has to swim.

Mr. Reed: Before we get away from this discussion I think that we ought to commend Dr. Deming in the selection of this subject and in the handling of his paper. In my position in the Government, we have a good many inquiries about nut matters, and they are usually from people who want to know how to start. The great call for information at the present time is from the beginners, not from the advanced people, and I am glad that Dr. Deming took that subject and handled it as he did, and I am glad that he proposes to issue it as a circular from this Association. It will be a great relief to others who are called on for information.

I should like to have a word, too, about this tap-root question. From what has been said it is pretty clear that there is quite a

difference of opinion. We sometimes think we can improve on nature in her ways by harsh methods and, while I know it is customary in the nurseries of the South to cut the tap-roots back pretty severely, I wonder, sometimes, whether that is always the best thing.

I haven't had any personal experience, but I have observed quite a good deal, and the tendency, it seems to me, is to try to develop as much as possible the fibrous root. Sometimes that is brought about by cutting the tap-root, or putting a wire mesh below where the seed is planted, so as to form an obstruction to the tap-root, so that it necessarily forms a fibrous root. Where the tap-root is the only root I doubt very much the advisability of cutting back too severely.

Col. Van Duzee: I have heard this subject discussed all over this country, in meetings of this kind, and a great deal of energy has been wasted. I do not think any of us know anything about it, but I do wish to say this, that when you come to transplant a tree from the nursery to the orchard, there are things of infinitely more moment than how you shall hold your knife between your fingers when you cut the roots. The exposure of the roots to the air, the depth to which the tree is to be put in the ground, the manner in which it shall be handled—those things are of infinitely more importance, because we know we can transplant trees successfully and get good results when the tap-root has been injured or almost entirely removed. I do not consider that the question of cutting the tap-root is of very serious importance, but I do think we should insert a word of caution as to the exposure of the roots of trees to the atmosphere, and make it just as strong as we are capable of writing it.

The Chairman: That is a very interesting point, that we have fixed our eye on the tap-root and talked too much about it. Not long ago one of the agricultural journals decided finally to settle the question about the time for pruning grapes, whether it should be done in the fall, spring, winter or summer, and after summing up all the testimony from enthusiastic advocates for each one of the seasons, the editor decided that the best time is when your knife is sharp; and that is very much the way with the tap-root. Be very particular in getting the root in and caring for it.

Mr. Pomeroy: Prof. Close, in a bulletin issued two years ago, spoke as does Col. VanDuzee about protecting the roots of the trees; he said "when the trees are taken from the box

that you receive them in, don't expose them to the sun or air, puddle every tree, and plant as soon as possible." I think that is pretty good advice. It doesn't cost any money, and takes very few minutes, to puddle the trees and it saves many of them.

The Chairman: I have tried the Stringfellow Method of cutting back top and root until my men asked me if I didn't want to transplant another tree instead, and they have grown just as well as trees on which I took great pains to preserve fine branching roots.

The Secretary: The last thing in my thought was to start a discussion of this perennial subject of the tap-root, but I should like criticism of this little circular, no matter how severe, because I am not finally committed to it and want to make it as useful as possible.

Prof. Smith: Every man likes to ride his own hobby horse. Would it not be wise to suggest that some of these seedlings be put in odd corners ? Certainly the hickory and walnut are adept in making themselves a home in the roughest kind of land.

The Secretary: I have tried that, but I don't think, as a rule, the trees do well when stuck around in fence corners and odd places. To be sure the trees I put behind the barn or pig pen have grown beautifully, so that at one time I thought of building barns and pig pens all over the farm to put trees behind, but where they were set in fence corners and out of the way places they have not done very well. I think the experience of others is about to the same effect.

Prof. Smith: My experience has been different from yours. I have some chestnut and walnut trees, on an unploughable hillside in the corner of my father's farm in Virginia which I stuck there ten or a dozen years ago and have done very little to them. Of course they are native. They have thriven. Nature does it exactly that way.

The Secretary: It seems to me there is no question that they will do better under cultivation. Of course they may do fairly well in odd places if they can dominate the other growth.

Prof. Smith: A man could take a pocketful of the various kinds of nuts and go around his fence corners and plant a few. In an hour he can plant fifty, and if he gets one to grow it is good return for that hour's work.

The Secretary: I have advised people to take a handful of nuts and a cane when they go out walking and occasionally stick one in.

The Chairman: In our locality, people would ask, "Why is that string of squirrels following that man ?"

Mr. Corsan: I have been planting nuts in that way for years.

The Chairman: If a man planted trees which belonged in his neighborhood, nuts that were already in the dominant ruling group, then his chances for success would be very good, but if he introduced in fence corners trees that had to adjust themselves to a new environment, he would find very few growing and the squirrels, other trees and various obstacles to development in the midst of established species, would wipe out most of them. Nevertheless, as it isn't much trouble, I would advise anybody to take a pocketful of hickory nuts out with him when he goes for a walk and plant one every little way.

A Member: The idea is good; let us follow it up.

Mr. Rush: I don't think it is feasible at all to plant trees around fence corners.

The Chairman: In our locality it would not do at all.

A Member: It won't do in any locality. The sods and grass around the tree will dwarf it and cause a very slow growth. Our time is valuable and we can't wait on that kind of a tree to bring results. Cultivation is the main need. Sometimes trees will do well where the soil is rich and competition absent. In Burlington, N. J. we found a walnut tree bearing enormous crops in a back yard. I have seen the same thing in this county, and also in Carlisle, and the Nebo tree, famous for its wonderful productiveness, has a similar environment. But it is high cultivation that usually is necessary for the best results in all trees, and walnut trees particularly.

The Secretary: Here is a note relating to this subject:

"The women of Sapulpa, Okla., who recently organized for city and county improvement and advancement, have determined to plant pecan, walnut and hickory trees on both sides of a road now being constructed through Creek County, basing their action on the theory that two pecan trees placed in the back yard of a homestead will pay the taxes on the property. They believe that when the trees begin to bear they will provide a fund large enough for the maintenance of the road."

The Chairman: That's all right if you can look after them.

Mr. Littlepage: It is very interesting to listen to these discussions of roadside trees and I have until recently been a strong advocate of them, but I have changed my opinion. I don't

think there is anything in the planting of trees in fence corners or along the roadside, for several reasons. The first reason is that nobody knows how long it is going to take that tree to amount to anything. I wouldn't give two cents a piece for trees stuck out where you cannot cultivate them and get to them to fertilize them. Another thing, we are right up against the problem of the insect pests of these trees and who is going to take care of them along the roadside ? The insect pests will get on them and come into the fields of the man who is cultivating and raising trees legitimately. Down in southern Indiana, now, we find along the roadside hundreds of walnut trees that are every year eaten up with caterpillars. They love those trees and come over on to my trees. I keep my trees cleaned off pretty well. There's that problem. Up to a short time ago I was an advocate of roadside trees. It would be all right if there was some means of cultivating them. If there is land somewhere that is of no use, so that it doesn't make a bit of difference whether the trees on it have insect pests or not, you can go out there and scatter nuts and let it alone and wait the length of time you've got to wait. I don't think it's of much value, however, even then. I don't think there is a thing in it. I used to pride myself on the fact that I had set out more trees than anybody else in the State of Indiana. I haven't bragged about that for a long time, though I have set out, perhaps, in the last eight or ten years, or had set out under my direction, about 750,000 trees; I am not particularly proud of that any more, but I am proud to meet the fellow who has set out twenty or thirty acres of trees on good land, the best he's got, and cultivated them and kept the insects off of them and burned them up instead of letting them prey on the neighborhood. I think there should be a law passed that these trees along the roadside must be cut down or that somebody will have to take care of them.

The Chairman: The original idea of roadside trees was constructive in its nature but failed to include the idea that, with the increase of orchard trees, or trees of any one species, we increase the insect pests because we disturb the balance of nature; and by disturbing the balance of nature we give advantage to insects which then remain on neglected trees to prove a menace to our own orchards. It we have various towns setting out roadside trees and detailing the children to look after them, asking the children to report on them, I believe the thing can be made a success and that the taxes of many a small town can be

paid from the nut trees along the roadside, provided you have one boy or one girl for each tree, their services to be given free and the profit from the tree to be given to the town.

Mr. Corsan: How about the cattle ? Let them keep grazing around ?

The Chairman: Oh, my, yes.

Prof. Smith: I think we sometimes let our feelings make us say things that our brains would scarcely approve. I believe Mr. Littlepage's charge against the tree on the roadside is not necessarily substantiated. I don't know just how he is going to take care of his trees, but if it requires a vehicle carrying spray, I submit that a roadside tree is about as well fixed as one in his field. If it requires a man with a stick or a hoe or a ladder, the tree on the roadside is in about as eligible a location as one in the field. If care implies the idea of turning over the soil, the roadside is handicapped, but nature has got along without having the soil upturned. My point is this; there is on nearly every farm in the East a little patch of land somewhere, a little row between a road and stream where a few trees can grow, and if fertilization is required, a few barrels of manure can go there as well as anywhere else. The fact that a tree is put in a place that is not ploughed doesn't mean that it is beyond all care. My point is that with care we can get trees in fence rows without tillage and that, in addition to Dr. Deming's formal and carefully cultivated plot, there is about every farm a place where a man can stick a few trees and give them such care as can be given without tillage.

Mr. Littlepage: I agree heartily with Prof. Smith's theory, but having had some experience, I find those things that he describes are not done; there is just that difference, always, between theory and fact. I read a beautiful book once, written by a woman, entitled, "There is No Death," and I found on inquiry that she had already buried four husbands. (Laughter.) I was much interested in reading, once upon a time, Rousseau's beautiful story of domestic life and I found that while he was writing it, his children were in an orphan asylum. A fellow teaching in the high school in Terre Haute, Indiana, married one of the beautiful attractive young ladies of that town. Shortly after they were married he was busy writing and turned and told her that he didn't love her any more and he wished she'd go home. She was heartbroken and left and it turned out later that he was writing a book on how to get to Heaven. (Laughter.)

There's just the difference between theory and fact. This is a beautiful theory. I used to be the strongest advocate of it, but all you've got to do is to go on a farm and try it. The trees won't get big enough to amount to anything in our lifetime, because these things you say you will do to them you don't do; at least, that has been my experience, and I would like to ask anyone to point to any section in the United States today, from the Atlantic Ocean to the Pacific, where this theory is carried out successfully; and yet I know it has been advocated for fifty years.

The Chairman: How about school children reporting on trees under their care ?

Mr. Littlepage: Whenever you give the proper care to them you solve the problem—whenever anyone will convince me that that will be done. There is no reason, of course, why the tree won't grow in these places, but my experience is that they don't thrive.

The Chairman: I've put out thousands of them for public-spirited citizens, but it would be difficult to find one of them today.

Mr. Rush: In France and in Germany the land is very valuable and they take a great deal of pride in their nut trees. The nuts we have here in the Lancaster market, Persian walnuts, are largely brought from France, Spain, Italy and Germany. The land being so valuable there, they devote much of their waste land to nuts, like Mr. Smith's idea of planting along the wayside, and they plant and cultivate them in their yards and in all corners. They would not, under any consideration, plant a maple tree just for the shade; the tree must serve for both fruit and shade, and those are some of the sources of foreign wealth.

Mr. Harris: I don't think the question is so much one of planting in fence corners as that we have a great deal of waste land on which the soil is very well adapted to growing nut trees. I know that sometimes in growing peach trees it is almost impossible to cultivate them. I know places in western Maryland where the rocks are lying so that you can hardly plough, and yet the soil is fertile and particularly adapted in some places for peach trees, and would be for chestnut trees. They have there a system of cultivation much as if you used the plough, and yet they are on steep hillsides. There is no reason, I think, why nut trees shouldn't grow there as well as on the level field where you can cultivate every inch of soil.

The Chairman: They are looked after, that's the whole thing.

Mr. Gowing: I come from New Hampshire and we have what used to be an old farm, but it is now a pasture and the soil is quite a potash soil, I think, amongst the rocks, and there's some apple trees planted there by the original man that worked this place. It was too rough to plough, but they have borne us as good apples some years as we have had on the place; and on this same piece of twenty acres or so, there's some chestnut trees more than two feet through that were cut off when the land was cleared, and they must have done well, for they grew to be such enormous trees.

The Chairman: The trees are planted on this same old stump land ?

Mr. Gowing: Yes, sir.

The Chairman: A great deal of stump land can be planted in this way.

Mr. Corsan: That wouldn't be planting them along roadsides and in fence corners.

The Chairman: No, they would be looked after; the whole thing is looking after them.

A Member: My idea is that there would be very few nut trees planted if every one was to start his own trees. They put off planting the trees even when they can get them at the nurseries, and if they had to start their own nurseries there wouldn't be one planted to where there's 10,000 now; and I think that in the end the nurserymen are going to attend to the planting of trees and the other people are going to attend to growing them. Maybe I'm mistaken but did this Government ever produce any trees ? Prof. Smith spoke of appropriating money and letting the Government get us some new variety. Hasn't it always been private individuals who get the new varieties? I have been trying to think of some fruit tree, apple or something, that a state or the Government has propagated.

The Chairman: In this country I believe the Government has never done it, but in some parts of Europe, especially Switzerland, the taxes of some towns are paid by the trees along the roadside; but there every man has to report on his own trees and the proceeds go to support the town, and the taxes of certain small towns are actually paid today by roadside trees; but this is in a country where land is valuable, and every tree is under the direct supervision of a citizen who must report on

it, and the product of that tree goes to the Government, he giving his labor instead of paying taxes.

Prof. Smith: I was merely pleading for the continuation and spread of that work, both geographically and in increasing the varieties of trees.

Mr. Lake: I am heartily in favor of that, but I think it ought to be referred to a committee. I want Prof. Smith to write it out in the form of a letter.

Prof. Smith: I am glad you called my attention to that.

Mr. Lake: The Government and the states are now engaged in such work and this ought to give it impetus. I think that the time and labor of the Nut Growers Association, since its organization, will have been well spent if we succeed in bringing to fructification this one resolution. I want also to suggest that Prof. Smith include among the nuts, the beechnut, because there's more meat in beechnuts for the amount of shell than any other nut we grow.

The Chairman: If there is no further discussion, we will have now to spend a short time in Executive Committee work. I think we will ask to have a Nominating Committee appointed first. Mr. Rush, will you kindly read the list of the names of the men you proposed to act as a Nominating Committee ?

Mr. Rush then moved that the Nominating Committee consist of Messrs. Lake, Hutt, C. A. Reed, Smith and Deming, and the motion was adopted, after which the Nominating Committee reported as follows: For President, Mr. Littlepage; for Vice-President, Mr. C. A. Reed; for Secretary and Treasurer, Dr. Deming. On Executive Committee: Dr. Robert T. Morris, in place of Mr. C. A. Reed. On Hybrids, Prof. J. R. Smith, in place of Mr. Henry Hicks. On Membership Committee, Mr. G. H. Corsan, in place of Prof. E. R. Lake. On Committee on Nomenclature, Dr. W. C. Deming in place of Prof. John Craig; the other committees to stand as heretofore.

Mr. Lake: I move that the secretary be instructed to cast the ballot of the association for these nominations.

The motion was seconded and adopted and the ballot cast in accordance therewith.

The Chairman: Now I will appoint as a Committee on Resolutions relating to Prof. Craig, Dr. Deming and the Chairman; Committee on Exhibits, Col. VanDuzee, Mr. Roper and C. A. Reed, and they will be here this evening to report on exhibits. Committee on Resolutions, Prof. J. Russell Smith

and Mr. T. P. Littlepage. There is no Committee on Incorporation. Will someone propose that we have such a committee ?

The Secretary: Isn't it a desirable thing that the society should be incorporated ? It was mentioned to me by a wealthy man that if anyone wished to leave, or give, some money to this association, they would be much more likely to do it if the society were incorporated.

The Chairman: I think it would be better for someone to make a motion.

Mr. Lake: I move that a Committee on Incorporation be appointed by the chairman; a committee of three.

(Motion seconded and adopted.)

The Chairman: The Committee on Incorporation will consist of Mr. Littlepage and Prof. Close. This evening we will meet informally here at about eight and tomorrow at ten we have the meeting at the Scenic to hear the papers of Mr. Rush and Prof. Lake and Prof. Reed, and see the lantern slides. We will first meet here at nine o'clock for an executive meeting and to look over the exhibits. The Committees will report at that time.

(After discussion, on motion of Prof. Smith, seconded by Mr. Littlepage, the selection of the place of the next meeting was left to the Executive Committee.)

The report of the Secretary and Treasurer was then read.

(SEE APPENDIX)

The Chairman: You have heard the Secretary's report. We had better take up, first, the question of deficit. What are we going to do about the $66.00 ? What prospects have we for the balancing of that account ?

The Secretary: That account will be easily balanced, and more than balanced, by the dues coming in and then I will proceed to run up a deficit for next year.

The Chairman: You have heard the Secretary's report. If there is no discussion, a motion to adjourn will be in order.

(Adjourned till December 19th.)

The Convention met, pursuant to adjournment, December 19th, 1912, at 9:30 A. M., President Morris in the Chair, and went into Executive Session.

It was moved and carried that the President be empowered to appoint a committee to attend the conference at Albany,

called for the consideration of the hickory bark borer, by the Commissioner of Agriculture of the State of New York.

The question of the publication of reports of the Convention proceedings in the American Fruit and Nut Journal, was next taken up and it was moved by Mr. Lake and carried that the papers and discussions of this Society shall be used for its own publications exclusively, except as the Executive Committee deems it to the best interests of the industry to furnish them for separate publication.

The Secretary: On November 8th, I received a letter from Calvin J. Huson, the Commissioner of Agriculture of New York, to this effect.

Dear Sir:

At the coming land show in New York this department proposes to have, as a part of its exhibit, a collection of native and introduced New York grown nuts.

Can you give us the names of growers of the better strains of nuts who might be able to furnish material for such an exhibit. Perhaps your association would be able to assist in the matter. The Department will be able to stand a reasonable expense for cost of nuts, expressage, etc. Perhaps a few seedling trees would add interest. . . . By the exhibit as a whole we wish to show the variety and quality of nuts that may be grown in this state. . . . .

Very truly yours,

CALVIN J. HUSON,
Commissioner.

He wished me to assist in getting up an exhibit, but as he only gave us a week I was unable to do anything. I do not know that there is any action to be taken on that, but I read the letter simply to show that the interest in nut growing is increasing and that this is an opportunity for us to make an exhibit another year.

Mr. Lake: Would the secretary take the trouble to make a collection of nuts covering the territory of the association and submit it for exhibit at a meeting of this character, this land show, giving credit to the donors for material, somewhat as Mr. Reed has done in pecans for the National Nut Growers Association ?

The Secretary: I think I'd have a few minutes to spare to do that.

Mr. Lake: I think it would be an admirable thing.

The Chairman: Yes, it would advertise the organization extensively and be a constructive step in agriculture.

Mr. Littlepage, have you any report from the Committee on Incorporation ?

Mr. Littlepage: That is a matter that will require considerable thought and attention. It will require attention from several standpoints, as for example under what laws we might wish to incorporate, so I think the committee will reserve its report to make to the Executive Committee at some later meeting.

The Chairman: We have no other business, I believe, and will now retire to the hall where we will have the lantern slide exhibition. The morning session closes the meeting and we are to meet at two o'clock at the Monument and from there go out to see certain trees in the vicinity. Mr. Rush and Mr. Jones are to show us these and their two nurseries.

Mr. Lake: I would like to offer as a resolution, that the secretary be instructed to make arrangements with the publishers of the American Fruit and Nut Journal for the distribution of one copy to each member as a part of his membership fee. The secretary will then be able to reach the members in his published notices without special printers' troubles of his own, and the members will be able to get some live matter right along.

The motion was seconded and adopted, after which the executive session closed and the members adjourned in a body to the Scenic Theatre, where the regular program was resumed as follows:

The Chairman: We will have Mr. Rush's paper first.

THE PERSIAN WALNUT, ITS DISASTER AND LESSONS FOR 1912

J. G. Rush, Pennsylvania

The year just closing has been full of disasters both on land and sea, though I do not wish it to be understood that I am inclined to be a pessimist on account of these occurrences.

I wish to speak of a disaster which overtook the walnut industry in the northern states. Early in the year we had an arctic cold wave which put the thermometer from 23 to 33

degrees below zero. This cold wave apparently did no injury to the walnut trees at the time but late in the spring it was discovered that the wood cells were ruptured though the buds and bark were uninjured. In cutting the scions in early April the bark and buds seemed in good condition for grafting; but as the time approached to do the work it was readily seen, by its changed color, that the wood was injured, some scions of course more than others. Those that were only slightly discolored were used in grafting. But as time passed the unhappy result came to light that out of about 2,000 nursery trees grafted only one graft grew. After climbing an 80 foot walnut tree to get our scions, and paying a good price for them besides, this was rather discouraging.

This cold wave, which was unprecedented for the time, had wrought other injuries to the nut industry. That was especially to the young trees that were transplanted the fall previous and last spring. The transplanting with a frost injury already was too great a strain on the feeble life of the trees. The consequence was that some of them died outright, and others made only a feeble growth. But where low and severe pruning was practised good results followed and such trees as were established on the original root system escaped the frost injury entirely. The young nursery trees with dormant buds were not affected in the least but made a strong growth of from three to seven feet this last summer.

The intense cold wave was such that some old and young seedling Persian walnut trees were killed outright, and not only the Persian walnut but in a few instances the American black was very much injured; likewise the Norway maple, magnolia, California privet and roses. Also the peach both in tree and fruit.

Now in conclusion let me say, what is the lesson to be learned ? First, as to the propagation of the Persian walnut, great care should be taken that only trees that are hardy should be propagated from, as well as having good bearing qualities with a first class nut. Second, after a freeze such as we had last winter, a special effort should be made to save the newly planted tree by close and severe pruniug. As, for example, I had a very fine two year old Hall Persian walnut which was referred to me as dead. I cut the tree off about 4 inches above where it was budded on the black walnut stock. It was not long after that signs of new life appeared and eventually it made a very fine, handsome tree.

Nature does indeed some wonderful tricks in this respect by which we can learn valuable lessons; and chief of these is close pruning.

Such a cold wave may visit us only once in a lifetime and should not discourage us from carrying nut culture to its highest development. We must not think for a moment that other walnut sections are exempt from similar visitations. They have then in the Pacific Northwest, and in France and Germany.

As regards the walnut industry for Lancaster county or Pennsylvania in general, I am safe in saying that a fair percentage of the farmers are taking hold of it. This is because of the fact that the San Jose scale has practically destroyed all the old apple trees around the farm buildings, and, not wishing to have the building denuded of the customary shade and fruit, nut trees are planted instead. This is in reality the practice prevalent in France and Germany where they utilize every foot of ground to profitable account.

The life of an apple tree is from fifty to sixty years whereas a walnut tree is just in its prime at that age and destined to live for hundreds of years afterwards. Then again the ravages of the chestnut tree blight are destroying the cultivated paragons just as freely as the chestnuts in the forests, which in a few years will be things of the past, thus giving still more room for walnut and other nut trees.

The Northern Nut Growers Association was organized for a grand and noble purpose, that is to stand together shoulder to shoulder to devise ways and means to bring nut culture to a grand and glorious success.

Mr. Corsan: The temperature Mr. Rush spoke of rather surprises me. Last year at Toronto it did not fall lower than 9 degrees below zero. We had summer almost until New Year's and then a very severe winter until April. I didn't notice any evergreen trees killed, but at Detroit, the Bronx and various other places, I never saw a winter so disastrous for killing evergreens.

The Chairman: Not only that but nurserymen all over eastern New England said they suffered greater losses last winter than ever before.

Prof. Smith: I would like to ask Mr. Rush if it would be possible to cut scions by December 1st, so as to escape danger from such great freezes.

Mr. Rush: I really have little experience in keeping scions. This fall I put some in the moist cold earth in the cellar. I think the experiment will be successful because I have known chestnut scions cut in the fall, to be kept under leaves in the grove till spring.

Prof. Smith: I should like to suggest that you try the following experiment; bury them, wrapped up in a gunny-sack or something, entirely underground where they will have absolute moisture and be shut away from the air. I have found that very successful.

Mr. Rush: Sometimes the trouble is they get too moist.

The Chairman: There is a principle here, and we had better keep down to principles as much as we can. That principle is that if the cells of the scions are distended with water a certain chemical process is going on all the while, because a scion is just as much alive as the red squirrel; it is a living organism. Now then, if the cells are a very little below normal dryness the chemical processes mostly cease, and that is better. We have to use nice judgment in avoiding having a scion so dry that its cells perish or so moist that its cells are undergoing chemical processes too rapidly. Our scions are cut, say, the last of November, then covered with leaves enough to prevent freezing and thawing. That will carry scions pretty well through the winter and perhaps is the best way, but we must never forget that in dealing with scions we are dealing with living red squirrels just as when we are dealing with pollen.

A Member: Are the leaves moist or dry ?

The Chairman: The driest leaves in the woods contain more water than you think they do. They carry enough to maintain the life of the cells, if they are packed pretty firmly about your scions, and at the same time the scions are still allowed to breathe. I keep them above ground. I put a layer of shingles on the cellar floor, if I've got a bare ground cellar floor, and then a layer of very fine leaves like locust leaves, then a single layer of scions and then a good big heap of leaves over those, packed tight, a good big heap of apple leaves or anything you have at hand. Try it on the basis of principles. It is a complex question. You can't settle any of these questions off-hand. Every man who has had much experience has learned that he needs a whole lot more.

Prof. Smith: Have you had any experience in fixing up a bed of scions like that and putting it in cold storage ?

The Chairman: Yes, but you must tell the cold storage people not to let them get too dry. Tell them you want them in moist cold storage, and to keep the temperature about 40.

A Member: We have found with walnuts that if you have the scions too damp they won't keep very long. If you have them just moist enough to hold them you can keep them all winter, maybe indefinitely.

The Chairman: If your cell is full of water the scion will work as hard as an Irishman.

A Member: I find that we have to graft them above ground, in the North, and if they are too moist when grafted they will dry up, but if kept dry they will grow, because they will remain in good condition until the sap comes up in the stock.

The Chairman: Yes, you must choose a position midway between too dry and too moist.

Mr. Littlepage: That is very important; they won't stand dampness.

Mr. Pomeroy: 'Wouldn't it be well to dip the cut end of the walnut scion in wax to hold the sap ?

The Chairman: I am afraid that would stop its breathing. You are dealing with a red squirrel all the while, remember that.

Col. Sober: My method is this: I have a little room about six feet wide with ice packs on both sides and double doors. In that I pack my scions in this way: I take carbide cans made of iron and put damp sawdust, about an inch or so, on the bottom and then I pack my scions in the cans, cut end down, then I put the top on loosely. I have carried them over the second year in that way.

The Chairman: But you let them breathe all the while ?

Col. Sober: Certainly, and they have but very little moisture. They are kept in a temperature of about 40 degrees.

Prof. Smith: How often do you wet that sawdust ?

Col. Sober: Not once.

The Chairman: Well, that's in keeping with our theoretical basis.

Col. Sober: I cut scions any time between now and March. I don't take them out of storage until we use them. We graft up to the middle of June.

The Chairman: I found some hickory scions that had been accidentally overlooked, kept under leaves, and the buds in the cambium were perfectly good after two years. In regard to winter injury—in the vicinity of Stamford, Conn., the nurserymen reported greater losses of all kinds in nursery stock than they had had before in their experience. I noticed that some small branches of the Persian walnuts had been injured, and particularly where grafts had started a little late and had not lignified quite thoroughly I lost whatever grafts had not had time to lignify. Last winter the injuries in our vicinity consisted chiefly of two kinds; occasional killing of the small branches—this does little harm because, where the branch is killed and dies back for a certain distance, we have three or four more branches starting up, so that perhaps it is not sophistical to say that it does the tree good. We get a larger bearing area than if it were not for this occasional freezing of small branches. Another form of injury occurs in the spring. The sap will start to ascend when we have warm days in February and March; then a few cold days come and, if we have absolutely freezing temperature at night, this sap freezes and when it freezes it expands, as water does everywhere, and the result is a bursting of the bark. That is an occasional happening with all trees but particularly with exotics. One kind of winter injury has been overlooked in connection with the walnut. The very last thing which the tree does in the autumn is to complete its buds for female flowers. That is the very last job the tree has on hand and if the tree cannot complete the buds for female flowers perfectly, then a very little wood killing will make that a barren tree, although it appears to be a good strong tree. That covers the kinds of winter injury I have seen in the vicinity of Stamford, Conn.

(Here Col. C. K. Sober of Pennsylvania showed lantern slide views of his orchards of paragon chestnuts and his methods.)

The Chairman: We will have now Mr. Reed's address with lantern views.

A 1912 REVIEW OF THE NUT SITUATION IN THE NORTH

C. A. Reed, Washington, D. C.

In taking up the question of the present status of the nut industry of the Northern States, we have to do more with what has not been accomplished than with what has been. Very little has been done toward developing the northern chestnut. What has been done has been mostly with the European species and so far that has not been very satisfactory. The European species is quite subject to the blight. The Japanese nut is not ordinarily of a quality equal to that of the American. It is thought, too, that with the Japanese chestnut the chestnut blight has been introduced, which has been so serious to our native species. The walnut has not become well established in the eastern states. So far, most of the European nuts that have been imported have been too tender to adapt themselves to our climatic conditions, and the filbert, when brought from Europe, proves quite subject to a blight that prevails everywhere with our native species, but with them is not so serious. In running over these slides, I will begin first with the chestnut. That is perhaps the best known species in this locality. That shows one of our native chestnut trees as it is familiar to you all in a great part of this territory under discussion, that is, the part of the United States east of the Mississippi River and north of the Potomac. That photograph was taken some time last June or July when the tree was in full bloom. The chestnut is one of the most beautiful of our native nut trees. This tree has the blight in one of the earlier stages and it is shown here merely to call attention to the disease, because no discussion of the chestnut industry at the present time can be complete without at least calling attention to the seriousness of that blight. That tree, perhaps, has not been affected more than two years, possibly one. Is that right, Mr. Pierce ?

Mr. Pierce: About two. That's an 18 or 20 inch tree, isn't it?

Mr. Reed: Yes, sir.

Mr. Pierce: It must be an 18 or 20 inch tree to be so badly blighted at the top.

Mr. Reed: Two years, but you see it's pretty well gone. We come now to the Paragon, one of the first trees of that variety ever propagated. It was planted where it stands, by the intro-

ducer, Mr. Henry M. Engel, at Marietta, where they had quite an orchard at one time, but the blight is so serious that there are only a few specimens of the trees left. That tree is probably in the neighborhood of twenty-five years old. The next slide shows two trees of the same variety that we may possibly see this afternoon. They are on the farm belonging to Mr. Rush and they are about twenty years old.

Prof. Smith: What have those trees yielded ?

Mr. Rush: They yield four, five, six and seven to eight bushels. You can see that they are not far from the barn and the roots run under that barnyard manure pile.

Mr. Reed: What would you consider an average crop ?

Mr. Rush: They grow five or six bushels per tree.

Mr. Reed: The greatest attention that has been paid to developing the paragon chestnut in orchard farming has been on the plan Mr. Sober has just shown, by clearing away the mountain side and cutting down everything but the chestnut sprouts. This photograph was taken in a thicket where the underbrush had not been cleared away. Those are a good age now or perhaps a little bit older than we usually graft, aren't they, Mr. Sober ?

Mr. Sober: Yes, sir; one or two years old. When they get to be three years old they are past grafting, according to my method.

Mr. Reed: This photograph was taken at Mr. Sober's a little over a year ago, taken in the rain and is not very clear, but it shows the distance between the trees at the time when these trees were four or five years old—is that right ?

Mr. Sober: They are eleven year old trees.

Mr. Reed: Do you thin them out after they get that size ?

Mr. Sober: Yes, sir, they should be thinned out more, but I hesitated on account of the blight; I have thousands that I could spare, but for fear the blight will take them out.

A Member: Do you cultivate the ground ?

Mr. Sober: I don't cultivate it, I just pasture it. The land is fertilized, but not cultivated.

Mr. Reed: That is a photograph of a large chestnut orchard in this county. It is not many miles from here. I understand that owing to the blight and to the weevil, that orchard has not been satisfactory, and I was told two or three days ago that it was being cleared away.

The Chairman: What varieties ?

Mr. Reed: Paragon and native stock.

A Member: Was that the old Furness Grove ?

Mr. Reed: Yes, sir. That slide shows the congeniality, ordinarily, between the stock of the native chestnut and the paragon. The next slide shows a typical instance of malformation between the Japanese and native chestnut. I understand that this is not unusual at all. The Japanese, ordinarily, does not make a good union with the American sweet chestnut. That slide was taken in Indiana. It is a twenty-five acre paragon orchard owned by Mr. Littlepage and Senator Bourne of Oregon, planted in the spring of 1910. The next slide shows one of the trees in the orchard during its first season. Mr. Littlepage had to have them all gone over and the burs removed. They were so inclined to fruit during the first season that they would have exhausted themselves if the burs had not been removed. They made a very promising start, but I understand from Mr. Littlepage that a number of the trees have since died. Is there anything you'd like to add to that, Mr. Littlepage ?

Mr. Littlepage: I haven't yet quite determined the cause of the trouble. Last winter I lost perhaps one-third of the trees with a peculiar condition. The wood under the bark was darkened. I sent some of them to Washington the year before to see if there was any blight or fungus and they reported there was none on any of the trees, but this winter perhaps one-third of the trees died down to the graft. A few, however, would sprout from the scion, giving me, of course, the grafted top again. It seemed to indicate, perhaps, a winter killing and yet I would not undertake to assert that that was the cause, but it was very serious.

Prof. Smith: Was the land low or high ?

Mr. Littlepage: High land along a hillside, very excellent land for chestnuts.

Mr. Reed: Sandy loam ?

Mr. Littlepage: No, it's a hilly clay with a considerable humus and set in clover.

The Chairman: Which way does it face ?

Mr. Littlepage: South.

The Chairman: That is rather bad.

Mr. Littlepage: I don't know. I have some over on the other side of the hill and I don't know whether the killing was greater on the other side or not.

Mr. Reed: We have before us a view of the original Rochester and its originator, Mr. E. A. Reihl, of Alton, Ill. Over in the Court House we have on exhibition nuts of that variety which most of you have seen. You are aware, probably, that it is a native chestnut. It is one of the largest and best of the native chestnuts and originated in southern Illinois, where so far the blight has not spread. It gives considerable promise for the future. We come back now to Lancaster county to a chinkapin tree, a hybrid chinkapin. The original tree stands in a forest in this county, and as you notice there, it is a very good sized tree. You might think from the looks of the photograph that that is a chestnut, but the nuts are small and borne in racemes, so they are typical chinkapins.

Mr. Lake: One parent was a chestnut ?

Mr. Rush: We don't know; it's a native tree; it's a hybrid.

Mr. Lake: It's a supposed hybrid.

Mr. Reed: Yes, the chestnut and chinkapin grow close together.

The Chairman: What is the form of the nuts ?

Mr. Rush: Round like a chinkapin. I think it was a chestnut on a chinkapin.

Mr. Lake: If it is a chinkapin, what is there to indicate that there is any chestnut blood in it ?

Mr. Rush: The size of the tree and the fact that the nut matures with the chestnut. The chinkapin is about three weeks earlier than this variety of chinkapin.

Mr. Reed: That photograph is typical of the Rush hybrid chinkapin. We take up the butternut now. So far as we know, there are no named varieties of the butternut; there cannot be until some good individual tree is found which is of sufficient merit to entitle it to propagation by budding and grafting. It is one of the best known nuts in our field, especially in New England; it is more common there than it is further south.

This slide shows the native butternut in the forests of southern Indiana near the Ohio River. Of course, those trees in forests like that don't mature many nuts. It is not in the forests, ordidinarily, that you will find individual trees of sufficient merit to entitle them to propagation. It is the tree in the open that has had greater opportunities than are afforded in the forest.

Mr. Lake: Are there any coniferous trees in that forest ?

Mr. Littlepage: No, that's an alluvial bottom, Mr. Lake. There is quite a long bottom by the creek where the butternut grows profusely. We have the same tree on the farm that Sena-

tor Bourne and I own. Hundreds of those trees grow in the woods there. It's rich alluvial soil.

Mr. Lake: The fact that it is rich alluvial soli does not usually bar coniferous trees; it may in your section.

Mr. Littlepage: There are none there.

Mr. Reed: The slide before us shows typical black walnuts that are almost as common, perhaps more so, in many parts of the area under discussion, than the butternut. This photograph was taken in Michigan where the trees are growing along fence rows without cultivation or special attention. No one knows whether the nuts of those trees are of special value or not. It merely shows the starting point for improvement in the walnut. We come now to the Persian walnut, which Mr. Lake will discuss more fully in a few minutes. This is one of the trees we will probably have an opportunity to see this afternoon. It is between Mr. Rush's nursery and the station, on the right hand side as you are going out. Just above the top of the fence you will notice a dark line which indicates the point of union. The Persian walnut was grafted on the black stock. The Persian is of slightly greater diameter. Now we have Mr. Rush in his walnut nursery. These are seedling walnuts in their third year.

Mr. Rush: Second year.

Mr. Reed: Second year from the time of planting. You will notice the luxuriant growth. The next slide shows the methods of propagation. This is the first step in the operation. The knife is similar to those on the tables in the Court House. The next slide shows the second stage in the operation where the bark has been lifted and Mr. Rush holds the bud of the Persian walnut in the fingers of his left hand, and the next slide shows the bud in position and being held firmly by a finger of the left hand. As soon as it is in position like that, Mr. Rush lifts the pencil—the instrument that he holds in the right hand and folds the bark back over the new bud and then cuts it on the outside, so that he makes a perfect fit. If anything, the bark of the black walnut overlaps slightly the bark of the bud, and the third step in the operation is the wrapping. Below, right at this point, is a completed operation. That was done in August, using buds of the present season's growth, and in about how many days is it that you take off the wrapping ?

Mr. Rush: About two weeks.

Mr. Reed: In about two weeks take off the wrapping; and about how much longer is it before you get a growth like that ?

Mr. Rush: About two weeks more, three weeks more.

Mr. Reed: In about four or five weeks from the time of the operation a growth like that is not uncommon.

Prof. Smith: When is the top cut off ?

Mr. Rush: When I see that growth is taking place I cut the top off in order to encourage the growth to get strong enough for the winter. Of course our object is to keep the bud dormant until the following season, perfectly dormant, but sometimes they do make a growth and, if they do, cut them off at the top and force them. You will not get that bud to grow next summer, but another bud starts out below that branch and gives you your tree.

Mr. Reed: That one dies then ?

Mr. Rush: Yes, sir, invariably dies.

Mr. Reed: There is one of Mr. Rush's own growing of the Rush walnut, a little tree which, in its second season, matured two nuts. That photograph was taken just about the time the nuts were ready to be gathered.

Mr. Corsan: I noticed in the nurseries at the Michigan Agricultural College, a lot of black walnuts that were sun-scalded. They were too far apart. Can anyone tell us anything about this danger of sun-scald to the trunk ?

Mr. Reed: Well, in this particular instance, the tree stands right next to a fence, so it is protected from the hot sun during a large part of the season. Perhaps Mr. Rush could tell us whether he has had any trouble with sun-scald.

Mr. Rush: Not at all, none whatever, never.

The Chairman: There is, in some localities, a great deal of danger from sun-scald. In the vicinity of Stamford, Conn., most of the Engiish walnuts will sun-scald more or less unless we look out for that and give them shade; mostly in the trunk below the branches.

Mr. Lake: How about the nuts ?

The Chairman: I haven't seen any scalding there.

Mr. Reed: These are all interesting points and I am glad to have them thrown in. Mr. Rush can tell us about this slide. It is one of the cut-leafed varieties of walnut from California that he is propagating. It is more of an ornament than it is a commercial nut, isn't it ?

Mr. Rush: It is both combined. It is very productive and very hardy. The nut is not quite as large as the Nebo. It is the cut-leafed weeping walnut. The first tree that came from California cost twenty dollars. It is very ornamental.

Mr. Reed: This is a view of a seedling Persian walnut orchard in Bucks county, this state, some twenty or thirty miles north of Philadelphia. It is now about ten years of age and is owned by Mrs. J. L. Lovett, of Emilie. Some of the nuts of this orchard are on exhibition over in the Court House. The orchard was not given any special cultivation at the time this photograph was taken. The nuts from the trees, of course, are very ununiform, being seedlings, and the bearing of the trees is not especially large, but the apparent thrift and vigor of these trees gives a good deal of ground for looking forward to a walnut industry in the eastern states.

Prof. Smith: Do you know the origin of the seed ?

Mr. Reed: No, sir, we do not. The nuts from which those trees were planted were obtained and planted by Mr. Lovett who is now deceased.

The Chairman: One of the most important features, it seems to me, of grafting, is the idea that we can graft from prolific trees. The majority of trees, of walnuts, hickories, anything you please, are not remarkably prolific, but in grafting you select a tree that is prolific as one of the most desirable of its qualities.

A Member: You say that this grove was given no particular cultivation; are they careful to allow all the foliage to remain on the ground where it drops ?

Mr. Reed: I couldn't answer as to that.

A Member: Mr. Sober, do you do that ?

Col. Sober: Yes, sir.

A Member: The point I wanted to make is that that is probably very much better than any cultivation that could be given.

The Chairman: The matter of cultivation is one we have got to settle in this country. I have been over the walnut orchards on the Pacific coast, in the East and in Europe, and I find three entirely separate and distinct methods of treatment. On the Pacific coast, the rule is to cultivate every year and irrigate where they can, but to cultivate, at any rate, whether they irrigate or not. In the East, where people are supposed to be very industrious, we have adopted the lazier way of letting the trees

grow in sod; but that is not so bad if we follow the principle brought forward by Stringfellow of letting the leaves all decompose, and adding more fertilizer and more leaves and taking away nothing. In France and Germany and England, where the trees are cultivated, particularly in France, where they are best cultivated, we find two methods; first, keeping up clean cultivation and adding a little lime every year and, second, add-lime without the cultivation. One great feature of the treatment of the tree in France, where the best walnuts come from, is the addition of a little lime every year, even if it's a limestone ground, and that may possibly account for the delicate character of the French walnuts and the reason why they have the first call in the market. I don't know that that is true, but it seems to me, at least, a collateral fact, and collateral facts often mean something.

Mr. Pomeroy: Judging from my own experience I think that that orchard would be producing now two or two and a half bushels per tree each year if put under cultivation and given the care of an ordinary peach orchard.

Mr. Reed: These are seedling trees, you understand, in that orchard we showed. This is a Persian walnut tree in Mr. Rush's front yard. I've forgotten the variety.

Mr. Rush: That is the Kaghazi.

Mr. Reed: Now we come to the original hickories. This is one of the earliest hickory nuts propagated, in fact, it's about the only one so far. That tree is owned by Mr. Henry Hales of Ridgewood, N. J.

Prof. Smith: Have they fertilized it ?

Mr. Reed: No, not especially. It stands on good, fertile soil but I think no attention has ever been paid to it in the way of cultivation.

Prof. Smith: Have you its yielding record ?

Mr. Reed: It never made large records; as I recall it now, it has never borne more than a few bushels at any one time, perhaps two bushels.

The Chairman: One reason is because it has been cut back regularly every year for scions ?

Mr. Reed: Yes, that's true.

Prof. Smith: Over two hundred years old, then ?

The Chairman: I doubt if that tree is over fifty or sixty.

Mr. Reed: That's what I should say,—somewhere in the neighborhood of fifty or sixty years old.

Mr. Reed: That slide shows a typical grafted tree in Mr. Hales' garden. It's a nice shapely, thrifty tree about seven years old and only recently came into bearing to any extent. The nurserymen have had great difficulty in propagating it until recently. Now that Mr. Jones has come up from the South and he and Mr. Rush are getting down together earnestly in the propagation of these northern trees, we will probably have more of them, but in all the years that Mr. Hales has been working with that particular variety, he has never been able to get more than a few trees grown in the nursery, so it is not disseminated to any extent.

The Chairman: Do you think that this will be like the pecan and hickory, that some varieties will bear fifteen years after grafting and other varieties two years after grafting, for instance, as extremes ?

Mr. Reed: Probably so, the same as it is with other fruits.

The Chairman: It seems to me that that is what we may fairly anticipate.

Mr. Corsan: Like Northern Spy apples and other apples.

Mr. Reed: This slide is a little bit out of order. It's a native Persian walnut tree that stands in this county. It is owned by Mr. Harness. Mr. Rush has propagated it under the name of Geit. That photograph was taken in the fall of 1911. Last year it suffered greatly during the exterme weather, but it came out again and made a very good growth. This is the original Rush tree that we may be able to see this afternoon. And this is the original Nebo that we had hoped to be able to see but will probably not succeed. It is some seven or eight miles from Mr. Rush's home and we will hardly be able to make it this afternoon. The slide before us shows some European filberts that were planted by Mr. Hales and up to the present time they are doing nicely although they have never fruited especially heavily; but there is no blight.

The Chairman: How many years ?

Mr. Reed: I think those are ten to twelve years old. Perhaps you have seen them.

The Chairman: Yes. There are two features connected with the filbert that we ought to discuss right here. One is the tendency to its being destroyed by the blight of our American hazel, which extends to Indiana, and another is the fact that it blossoms so early that the female flowers or the male flowers are both apt to be killed by the frost. All the members of this Asso-

ciation ought to get to work to bring out a variety which will have the blight-resisting features and the later blooming of the American hazel.

Mr. Reed: This slide shows a filbert we will probably be able to see this afternoon. It is in Mr. Rush's door yard and is still pretty young. I believe it has not borne of any account.

Mr. Rush: It has borne a little.

The Chairman: How old is it ?

Mr. Rush: I think it's about five years old. It is a Barcelona.

Mr. Reed: The next slide is taken in the orchard of Mr. Kerr at Denton, Md. At one time he had a very nice orchard of these filberts, but the blight has gotten in and has about wiped out everything. In a letter from him this fall he said he had very few nuts of any variety, although he did have a few. A letter that came this week from J. W. Killen, of Felton, Md., said he had found filberts to be about as unprofitable a nut, as any he could have grown.

We will spend a few minutes now running over the pecan situation. We can hardly omit it altogether because there are so many people in the northern states who are interested in the pecan in a financial way. The chart before us shows first the native area. This part here is the portion of the United States in which the pecan is a native. You notice how far upward it extends, almost to Terre Haute, Indiana, and across southern Indiana along the Ohio River, and it is right in here, about where the pencil indicates that some of our best northern varieties have originated. Mr. Littlepage and W. C. Reed and others have shown us nuts over in the Court House that originated there. The Busseron and the Indiana are the two most northern. They are a little way north of Vincennes. No varieties so far of any merit have originated in Illinois. While we have the map of Illinois before us, I would like to point out the place where Mr. Riehl originated the variety of chestnut we referred to some time ago. Down in more southern Illinois is where we find Mr. Endicott. This darkened area along the southeastern part of the United States, and extending away up into Virginia, shows the area to which the pecan has been planted with more or less success. This area extending down over the Piedmont and up into Virginia and West Virginia, is the mountain area to which the pecan is not adapted. You never find pecans on the uplands. This thick, heavy area shows the territory within which the pecan has been most extensively planted.

It is not common down in southern Florida. You notice, too, that over here in Texas there have been very few orchards planted to pecans. North of these shaded areas, anywhere up in Ohio or Pennsylvania or New York, the pecan has not shown any adaptability or has not shown sufficient adaptability to justify commercial planting. Whatever planting of pecans is done in the area north of the shaded portions there must be considered as experimental.

The Chairman: The southern part of Texas is actually in the tropical zone. It would be interesting to know if we have the pecan actually growing in the tropics.

Mr. Reed: We have more or less vague reports that it is growing down near Brownsville. I think Mr. Littlepage told us the other day of a friend of his who is planting pecans.

The Chairman: Brownsville is very close to the tropics.

Mr. Littlepage: Mr. Yoacum told me he had a grove down there that had not been a success so far. I know that quite a number of people have discussed the question of planting pecans in that section.

Mr. Reed: This is one of the largest of pecan trees; it is the largest that it has ever been my personal privilege to see. It has a circumference of between 18 and 19 feet and a spread of about 125 feet. We estimated that it was about the same height. It stands on the west side of the Mississippi River, some distance south of Baton Rouge.

Mr. Littlepage: What is the approximate water level below the ground ?

Mr. Reed: It is quite near the surface.

Mr. Littlepage: I thought so. There are conditions you will observe that are unusual. In lands where the water level is near the surface, there is a tendency in the tree to shove out a lot of surface roots. You can travel all over the pecan belt of Indiana and will never see a pecan tree that does not look as if it had been driven in the ground with a pile-driver, but I have noticed that you find those spreading roots where the water level is near the surface of the ground.

Mr. Reed: It is interesting to know that right near this tree were other large trees, nearly as large, that were blown over, and they showed no tap-roots, but merely the surface roots, This slide shows a pecan bloom. The pistillate bloom is clear up on the terminate growth; the staminate, like other nut trees.

is on the growth of last season and comes out somewhat in advance of the pistillate, necessarily.

We come now to the wild pecans of Texas. The recent census figures show that fully three-fifths of all the pecans produced in the United States come from Texas. This photograph shows the native wild pecans along the Colorado River. Here is the pecan as a park tree. This picture was taken in Llana Park, New Braunfels, in west Texas. One of the nuisances in pecan trees is illustrated in the upper part of this photograph; you will notice the Spanish moss that grows so densely on the pecan trees if neglected. Unless the moss is kept out it gets so dense that it smothers the fruiting and leafing surface, so trees that are densely covered with that are able to make leaves only on the terminals. You notice in the rear the leaves of bananas that grow there throughout the entire year.

The Chairman: I have noticed that the mistletoe was a bad parasite on the pecans in some regions. Have you found that ?

Mr. Reed: Yes, that is true; that is one of the pests of the pecan. This slide shows a typical Texas scene. The wild pecans have been gathered and are brought into town and are waiting the buyers. You will notice right here is a bag that has been stood up and opened, waiting for a buyer, the same as we see grain in the streets of northern towns, and here are pecans on their way from the warehouse to the car. The next slide shows another step; they are on their way now from Texas to the crackery or the wholesalers. The crop of pecans in Texas alone usually runs from 200 cars to 600 or 700 cars. This year the crop is small and probably not over 200 cars, so the prices are going up. This is the pecan crackery in San Antonio, having a capacity of 20,000 pounds a day. The pecans are cracked by machinery and the kernels are picked out by hand. This slide shows a native pecan tree. The one in the foreground was from across the river near Vincennes. It is one of the first northern varieties that was introduced, but it is now superseded. The next is the original tree of the Busseron. The nuts from that tree are on exhibition over at the Court House brought here by Mr. Reed. The tree was cut back quite severely several years ago to get budwood and has not made sufficient top yet to bear normal crops again. This is the original tree of Indiana. Besides the tree is the introducer, Mr. Mason J. Niblack, the gentleman with his hand by the tree. Now we come to the original

Green River, one of the northern Kentucky pecans. It is in a forest more than twelve miles from Evansville across the Ohio River in Kentucky. The trunk of that tree is typical of others in the forest. There is a pecan forest of perhaps 200 acres, from which everything but pecan timber was removed several years ago.

The slide before us shows the trunk of a supposed chance hydrid between hickory and pecan. The next slide shows a grafted tree of that variety. It is interesting to note the vigor of this hydrid. It is quite the usual thing to get added vigor with hybrids. This is one of the most beautiful, dense, dark green trees that I have ever seen in the hickory family. This tree is in northern Georgia, but it is not so prolific as the parent tree.

The Chairman: Does the shell fill down there ?

Mr. Reed: No, it does not.

The Chairman: It grows very vigorously in Connecticut. It is a perfectly hardy hybrid, but I am afraid I shall only be able to use the crop for spectacle cases.

Mr. Reed: This shows one of the most common methods of propagating the pecan, the annular system. It is a slight modification of the system Mr. Rush applies to the propagation of the walnut. This shows one of the tools designed especially for annular budding, the Galbraith knife. The rest of the operation you already understand. It is merely placing the bud in position and wrapping the same as Mr. Rush does.

The Chairman: I would like to ask, does it make a great deal of difference whether the bud ring is half an inch long or an inch and a quarter long ?

Mr. Rush; It does not make any difference. The union takes place on the cambium layer. It is not made on the cut.

The Chairman: Then the length of the bud is not of great importance ?

Mr. Rush: No, it is of no importance at all.

Mr. Reed: This slide may be a little bit misleading. Two nuts matured in the nursery on a scion that was inserted in February. The scion was taken from a mature tree and the fruit buds had already set and had enough nourishment to carry them through the season so that they matured. That is no indication of what may be expected in the way of bearing. It is one of the freaks. This is merely a view of a fourteen-year old pecan orchard in south-western Georgia, a 700-acre orchard owned largely by one person. That is the orchard belonging

to Mr. G. M. Bacon, a name probably familiar to some of you. Those trees are set 46 feet, 8 inches apart, each way. There are twenty trees to the acre, just beginning to bear now. That photograph was taken some two years ago showing the first step in topworking. The top has been removed, as you notice, and the next slide shows the subsequent water-sprouts which are later budded. The lower branches were left in the first place to take up the sap while the new head was in formation. They have now been removed. Our next point might be brought out in connection with this slide. One of the typical, sub-tropical storms, not unusual in the Gulf States, swept over this area in September, just as the nuts were beginning to mature and defoliated the trees and whipped off the nuts. The sap was still in circulation, and the varieties that respond most readily to warm weather, that start earliest in the spring, sent out new leaves, so that foliage was foliage that ought to have come on the next year, that is, it was exhausting next year's buds. The same year the tree sent out its blossom buds, so it had no fruit the following season. This slide shows one of the pests in the pecan orchard, the twig girdler, at work. The insect deposits its egg under the bark up at about that point, then goes down below girdles the twig, and it breaks off, goes to the ground, and the insect comes out, goes into the ground and comes out the next season. There are a good many drawbacks that are occurring and more are to be expected the same as with other fruit. There are probably no more setbacks to pecan growing than there are to the growing of other fruit, but this is one of the things. This orchard was set in land bordering the Flint River and at the time this picture was taken the water stood at the depth of three feet. It probably did no harm, because it didn't stay more than a week or ten days. Sometimes it stays longer and in such cases it is a serious matter. In Texas, floods come up like that into the branches of the trees, so high in some seasons after the nuts are formed, that the nuts deteriorate and fall to the ground. In such cases it is a pretty serious thing. (Applause.)

The time for which the "scenic" was engaged having expired, the delegates returned to the Court House and the regular program was resumed.

The Chairman: We will next hear from Mr. Lake.

Mr. Lake: My topic, aside from the slides, was concerning the result of the work at Arlington this year. It is all written out but I don't propose to read the paper at this stage. I have

not been a teacher and lecturer for 25 years for nothing, and I don't propose to kill the few friends I have among nut growers by talking them to death when they are hungry and want to see something interesting. I will send this paper in due time to the secretary, and give way now to Mr. Jones. I did want to show you on the slides a few illustrations of cross fertilization between the Japanese and the American walnut, but we will put those in engravings and put them in the Northern Nut Growers' Journal, so that you will see them there with better satisfaction. Now one or two words about these Persian walnuts. These are eastern grown seedlings, the best that I have been able to pick out. Here is an Oregon grown nut. That is the ideal type for dessert walnuts. This is the Meylan. There is only one better, and that is the real Mayette, of which we grow very few in the United States, but we are growing considerable of the Meylan. Whether we can grow this successfully here or not, I am not certain, but it is well worth trying. The better type of our nut seedlings in the east are from the Parisienne. We must get a nut something like this that you can crack between your fingers, not one that is sealed so hard that it requires a hammer, and must get one with a very good quality of meat. One great advantage to the walnut grower in the East will be that he can get his crop on to the Thanksgiving market, which is the cream of the market—something the Western or European nut grower cannot do. So if we can grow a nut reasonably fair in quality we can expect excellent results.

The Chairman: Mr. Jones, will you give us your points now?

Mr. Jones: Dr. Deming yesterday asked me to give a little demonstration of grafting and I have brought along a sort of transplanted nursery on a board, so that I might do so.

(Here Mr. Jones demonstrated methods of grafting the pecan.)

The Chairman: Tell us about the wax cloth, Mr. Jones.

Mr. Jones: We use that over the cut.

The Chairman: How do you make your wax cloth ?

Mr. Jones: We take a roll of this, possibly three or four yards long, very thin muslin, roll it up and drop it in the melted wax.

The Chairman: How do you make that wax ?

Mr. Jones: We don't measure the ingredients, but I think it varies from four to six pound of rosin, to one pound of beeswax and a tea cup full of boiled linseed oil and about a tablespoon of lamp black.

Prof. Smith: What do you use the lamp black for, Mr. Jones?

Mr. Jones: To toughen the wax so that it will not crack and so that it will adhere better.

A Member: How do you get your excess of wax off the cloth?

Mr. Jones: We just throw the rolls on a board and press them.

Mr. Reed: I believe you would find it easier to tear it up into strips than to put it in rolls. We have been using that method. We ran short of cloth and I went to town and got some and tore off a piece about 8 or 9 yards long and folded it up into strips that wide and dipped it in the pure beeswax and pressed it on a board and it was ready for work.

Col. Sober: I take just a common corn cob and wind it on as you would on a spool, then, while the wax is warm, I dip it in; you can have the cloth half an inch wide or an inch wide just as you please. My way of making wax is, I take two pounds of rosin, one pound of beeswax and half a pound of tallow. I find that stands all kinds of weather.

Mr. Jones: You prefer the tallow?

Col. Sober: Yes sir, I do.

The Chairman: Beef tallow or mutton tallow?

Col. Sober: I prefer mutton tallow; two pounds of rosin, one of beeswax and half a pound of tallow. Then you want to boil it very slowly and thoroughly, and pour it in cold water.

A Member: Do you unroll this roll of cloth?

Col. Sober: I have a machine to turn it on just the same as you would on a spool.

Mr. Jones: The strip goes through the wax?

Col. Sober: No, you wind that, then when your wax is warm, you drop this in but secure the ends, then take it out and lay it by till it's all saturated; then I tear it off as I use it. I find that is the most convenient thing, and I generally get calico, that is pretty closely woven, but is rotten so that it tears easily.

Mr. Jones: Did you ever use raffia for tying your grafts?

Col. Sober: No sir, I have not.

Mr. Jones: We have used it on pecans and walnuts for the reason that it doesn't have to be untied as it bursts off with the growth of the tree.

Col. Sober: This wax I have tried on thousands and thousands of grafts and it stands all kinds of weather. You can

get wax that's been there 8 or 10 years and you can take it off now and use it.

Mr. Jones: That is one advantage of using the tallow; linseed oil will dry out.

Col. Sober: Tallow is the best; that's been my experience.

A Member: If linseed oil is not used immediately or very soon, it gets hard.

Mr. Jones: It's all right in wax and all right in cloth, too, if you keep it in a damp place till ready to use.

Mr. Hutt: Can you use parafine in place of beeswax ?

The Chairman: Have you tried this method on the other hickories besides the pecans ?

Mr. Jones: Yes sir.

The Chairman: You've got shagbark to catch fairly well, have you by this method ?

Mr. Jones: Yes sir.

The Secretary: How did your pecans and hickories do last summer ?

Mr. Jones: I've forgotten the exact percentage that grew. Some died after they had made a growth of several inches. I think I left too many limbs growing on the hickories. Some of them made quite good growth.

A Member: When is this kind of grafting done ?

Mr. Jones: We wait until the sap is up.

The Chairman: What do you cover the top with ?

Mr. Jones: With wax. We leave this open at the bottom, for the reason that the sap can get out and not ferment. If it holds the sap, it will sour you know.

The Chairman: How far down does your wax go, Mr. Jones?

Mr. Jones: Far enough to cover up the wrapping.

A Member: Does that work on pecans as well as hickories ?

Mr. Jones: Yes sir. To show the value of this patch, we have grafted rows side by side and got 80 per cent where we used this patch and 34 per cent where we waxed it over solid and left no ventilation or exit for the sap.

A Member: Isn't that to keep the wax out of the cambrium layer?

Mr. Jones: Yes sir, it does that too.

Prof. Smith: Are there any fine points about this trimming, other than mere wedge ?

Mr. Jones: No sir, only it's thick on one side, as you will see so that it wedges tightly.

A Member: Isn't it a fact that you can use three and four year pecan wood just as well ?

Mr. Jones: Yes sir, two year wood or three will give you better results than one year.

Col. Sober: What time in the season do you graft ?

Mr. Jones: The 20th of April to the 20th of May here.

Prof. Smith: What stage of stock do you prefer ?

Mr. Jones: Well it doesn't matter, you can graft these after they have made a foot of new growth, if you've got a good dormant scion; you could put in a graft any time in the summer, perhaps.

A Member: How long do you leave on the paper bags ?

Mr. Jones: Until the scion begins to grow. Sometimes I have made a mistake and left them on until they grew up and curled down.

Prof. Smith: What is the superiority of that over plain cleft grafting ?

Mr. Jones: You can do better work and do it quicker. I have put in 1200 grafts in a day.

The Chairman: You don't mind this arch being left up ?

Mr. Jones: That ought to go a little deeper, maybe, but it don't make much difference, so long as it is well waxed.

Prof. Smith: The paper bag protects the scion ?

Mr Jones: Yes sir. The object is not to protect the scion so much as to keep it dry. You want to keep the scion dry until it gets sap from the stock to start it into growth.

Prof. Smith: Is it necessary that this should be waxed cloth?

Mr. Jones: No sir, we use paper ordinarily, of course we run wax over the paper in waxing the scion and then the paper is as good as cloth.

Col. Sober: Do you find it apt to curl up in windy days—the paper ? I tried that and had all kinds of trouble until I got on to the tape.

Mr. Jones: We don't try to tie with the paper; the paper is only to let the surplus moisture or sap out.

A Member: Does this tend to hold that in or is it all held in by the patch there ?

Mr. Jones: This doesn't really need any tying, as it is large.

The Chairman: Would you carry the patch around to the other side ?

Mr. Jones: No sir, just fill it up with wax.

The Chairman: And the juice runs out of there and will escape anyway.

Mr. Jones: Yes sir.

A Member: Do you wax in addition to the paper you put on.

Mr. Jones: We don't wax the scion all over. We used to take hot wax and run a thin layer over the whole scion, but we quit that and used the bag, because if you wax over a scion tight and it happens to have sufficient moisture, it will start growth with that moisture before it makes the union.

Prof. Smith: Do you wax the tip end ?

Mr. Jones: Yes sir.

Prof. Smith: Do you wax this in here ?

Mr. Jones: Yes sir; we fill that over with liquid wax. It is possible to have your wax too hot, and burn the scion.

Prof. Smith: Have you found that all the species of hickory take grafts with equal ease ?

Mr. Jones: We grafted some here last spring that started very nicely and then died. I don't know whether it was in the hickory stock or whether they were robbed by the sprouts; we didn't pull off any sprouts. There's a whole lot of things we don't know about grafting yet, but will know more in time.

The Chairman: How about using scion wood more than one year old ?

Mr. Jones: We prefer two or three year old wood for the scion. We have coming now, 3,000 walnut scions from California and they are all to be two and three years old. I have put in rows of 100 with large two year scions and you could count 100 and not find one dead among them and some of the scions were almost as big as my wrist. It's a job to cut them. You see that scion, being large, has enough vitality to hold it until it can make a union.

A Member: You want one bud on this ?

Mr. Jones: We generally have two buds.

A Member: Do you use the same method on the Persian walnut ?

Mr. Jones: Yes sir; we got a little stingy one year and cut these all to one bud and hardly got any out of them. You've got to have wood enough to hold the scions dormant; of course there may be one or more buds on the scion.

The Chairman: And got to have food enough in them.

Mr. Jones: Yes sir. Col. Sober grafts chustnuts that way,

but I have never been able to graft pecans and walnuts with very short scions.

The Chairman: I have caught chestnuts with one bud, but most of the nut trees want more food and you've got to have a lot in the scion.

Prof. Smith: Have you used that with pecans in the North ?

Mr. Jones: Yes sir, this will be our method of propagation.

After Mr. Jones had given further illustrations of the process of grafting, the convention adjourned.

SOME PERSIAN WALNUT OBSERVATIONS, EXPERIMENTS AND RESULTS FOR 1912

E. R. Lake, Washington, D. C.

The Arlington work for 1912 in the propagation of the Persian walnut consisted in top-grafting three and four year old nursery stock by several methods, as ordinary cleft, side cleft, bark cleft, prong, whip and modified forms of these. For wrapping we tried bicycle tape, waxed cord and cloth, with wax and plasticine for covering.

The work was done during the latter part of April and first part of May. The stocks averaged from $\frac{3}{4}$ to $1\frac{1}{4}$ inches diameter, and were cut off from 16 to 30 inches above the surface of the ground. In a few cases bark grafting by modified whip form was performed upon the branches at a height of about 4 feet.

Later in the season from June 12th to August 25th buds were placed by varying methods. In the earlier instances the buds were taken from left-over grafting stock. Of the scion wood received last year all the wood from Eastern growers was frost bitten and wholly failed to take with one or two exceptions.

The Pacific Coast wood was received in excellent condition and operations with it were gratifying, especially with the ordinary cleft graft, and patch bud.

Next year's work in grafting will be confined to the cleft, and the bark-whip processes. This latter is very simple and under careful treatment promises to be a convenient and successful process.

In the budding operations we resorted to a number of methods largely for the benefit of the information obtained from the practice, and not so much for the returns in propagated trees.

However, for 1913 in the work of propagating for stock results we shall confine our practice to the patch method, though we may find from later tests that the hinge method so favorably looked upon by Oregon is better suited to the work.

Various experiments with tying material were tried. Raffia, cotton cord, waxed cloth and bicycle tape were used. The raffia and cord gave best results. A tight tie is needed.

June-budding from the left-over graft-wood gave a very low percentage of "takes." Most of the buds appeared to be drowned. Buds from the current year's growth inserted from early to middle of August are at present apparently in good dormant condition.

Some July buds from the left-over graft-wood placed in the younger branches of a twelve year old American black took well and made from three to six inches growth. The branches were cut back as soon as the buds appeared to be set, a course that would not be advocated if one were doing the work for re-topping. The young wood from these buds is delicate and soft and in order to insure their living through the winter, so far as our efforts may avail, they have been enclosed in strong paper bags. In our budding and grafting operations we had no success with the Japanese or Chinese stocks. We expect to try them further as their rapid growth makes them much to be desired if a permanent union can be effected. So far as we have been able to learn from the southern propagators who have worked along this line, no difficulty has been encountered in effecting a short-life union,—four to six years on an average, though a few have kept alive for twelve years.

The growth of the successful grafts has been very variable. In several instances in which both scions upon a stock grew, the growth was from two to three feet. In other cases the young wood was scarcely a foot long.

The fact that the stocks and scion-wood varied widely in size and vigor and the further fact that the scions were from several varieties of western stock are quite sufficient causes for no uniform results in this respect.

The wood of all successful grafts appears to be in excellent condition for the winter season and we are looking forward to an interesting further growth of these next year, though the trees have just been transplanted. In order to doubly insure ourselves against loss of the varieties now growing one half, or even more in a few instances, of the young wood has been removed

and placed in a cold room so that further grafting or budding of these varieties may be made next year.

Nursery trees of the Franquette, Pomeroy, Parisienne and unidentified others, on their own roots are making a pitiable effort at successful growth, while all wood on the black stock is making excellent growth.

In one instance the wood of Mayquette a cross between Mayette and Franquette formed two nutlets. Lack of pollen was all that prevented the fruiting of one-year-old grafted trees. A splendid point for the unit orchard booster, but a point of no value to the real walnut grower.

CROSS FERTILIZATION

Owing to the very vigorous weather of the past winter the catkins on the older Persians at Arlington Farm were killed. In order to study the conduct and product of these trees we sought pollen elsewhere to fertilize their liberal display of pistils. We were successful in obtaining some from the trees of Messrs. Killen and Rosa, and Miss Lea, but though this and some pollen of black, butternut and the Japanese was used no pollenation was successful.

In the case of sieboldiana, however, we succeeded in securing what appears to be fruit of certain definite cross-fertilization, as sieboldiana x nigra; sieboldiana x cinerea and possibly sieboldiana x regia.

Only in one instance did the nuts appear to have other than the usual characters of sieboldiana.

The nuts of the cinerea cross were longer, more tubular and somewhat deeper furrowed and darker.

Unfortunately some conflicting results in the fruiting of the sieboldiana places the possible cross-fruits under a cloud.

A peculiarity of the blossoming of the sieboldiana at Arlington this year was that the stamens and pistils of an individual tree opened at dates of six to ten days apart, and with the tree used for crossing the catkins were all off before the pistils opened. As no two trees are near together, perhaps two to three hundred feet being the closest, natural cross-pollenating was not expected. However, after the cross-pollenations by hand were made and fruits set, and even matured, it was found that some clusters had from one to three more nuts than were hand treated. Many of the clusters had less nuts than the number of pistils treated. which was to be expected.

But how to account for the extra sets is a problem not clear for it is possible that pollenation might have occurred in one of two ways—by stray pollen grains from the hand operations by wind-carried grains from the trees. In any event only the fruiting of the trees from the nuts under consideration will settle it, and as these have been planted we are on the way to the solution.

THE INDIANA PECANS

R. L. McCoy, Indiana

The pecan is probably the best nut that grows. It belongs to the hickory family which is indigenous to North America. Since water is its natural distributing agent it is most generally found growing intermixed with the large hickory nut or shagbark in creek and river bottoms. While the hickory is hardy enough to thrive even into the Canadian provinces the pecan is not so hardy and is seldom found in the northern tier of states. It thrives well as far north as the northern boundary of Illinois. The writer has seen a transplanted tree in bearing in Branch County, Michigan, and native trees along the Mississippi River near the mouth of the Wisconsin.

The nuts in the extreme northern limit are not much larger than a hazel nut. But the nuts that grow in Indiana and Illinois from the Ohio River on the south to Rock Island on the northwest and Lafayette on the northeast are much larger. Here are found many superior nuts worthy of propagation. In fact, the writer has before him a great many nuts of named and unnamed varieties which he and Mr. Littlepage and others have discovered in their search for worthy nuts in the native pecan woods. There are many thousand acres of these groves on the Ohio, Green, Wabash and Illinois rivers where many trees are found which bear nuts as large as some of the varieties which are being propagated in the Gulf Coast country.

The nuts of the Evansville group are especially noted for their fine flavor. The people of this section will not eat southern pecans if they can get native nuts. This year several carloads of these native wild nuts will be shipped to the Cleveland, Boston, and New York markets. While the finer nuts seldom get into the markets at all but are bought by wealthy men in the

locality where they grow. Many men buy from a special tree year after year—its flavor suiting their taste.

The yield from some of these larger trees (and there are many of them four feet in diameter and some as large as nineteen feet four inches in circumference at shoulder height) is very good. The writer has seen a number in the last few days which were estimated to have from four to six hundred pounds, the most of the crop having not yet been gathered. He knows of one tree which bore (17) seventeen bushels and Mr. Louis Huber of Shawneetown gathered 718 pounds from another tree. Two hundred and eighty-five pounds of nuts were gathered and weighted from the Luce tree. These nuts were gathered green for fear of their being stolen and it was estimated that fifteen pounds were left on the tree. Also that the hail storm in early September destroyed fifty (50) pounds more. Hence the Luce bore approximately eight bushels. The Kentucky tree had four and one-half bushels by measurement. The Warrick tree had, the best we can estimate, about 150 pounds. The Grayville, or Posey as Mr. Littlepage wishes to call it, bore at least two hundred pounds by weight. One hundred and sixty pounds were gathered from the Major and two hundred and fifty pounds from the Green River tree. We do not think the Hinton bore to exceed two pounds of nuts. We do not know the amount of nuts gathered from the Indiana and the Busseron trees. The Buttrick tree had some three or four bushels of nuts this year but as a dredge ditch was recently constructed by it, destroying half of its root system, it did not mature its crop. This tree has been in bearing since 1817 and it has not been known to miss a crop previous to this year.

In our search for nuts worthy of being propagated we have found several nuts as yet un-named that are in our opinion much superior to any northern nut that has been brought to public notice. But as we know little of their bearing record and do not wish to burden the nurserymen with too many varieties we will keep these trees under observation for a year or two before naming them.

We have been trying to propagate some of the best varieties at our nursery for about three years. Our first attempt was root-grafting in which our success varied from 15 per cent to 75 per cent under the best conditions. We found after some experience that it was not difficult to root-graft. But last winter, 1911-12, was the coldest winter for some years, the thermometer

registering as low as 20 degrees below. Most of our root-grafts were killed back to the ground but few if any of them were killed outright. When spring came they started new growth and are now about four feet high. The fall of 1911 was very warm and wet and they were in vigorous growth until the first week in November when we had a hard freeze which killed the wheat, causing the worst failure in that crop ever known in this section. The winter then following being very cold we had two conditions against spring root-grafted pecans. But we failed to see any budded ones that were injured. However, we only had pecans budded to hickory which was done by Mr. Paul White in May, 1911 and, so far as we know, this was the first hickory top-worked to pecan in Indiana. However, he now has quite a number top-worked last spring that have made a growth of three or four feet. We also have both budded and root-grafted pecans from last spring and summer so that in the spring we will have a better opportunity to see what effect the winter will have on them.

So far as we are able to determine from our observation of a few orchards all pecan trees bought from southern nurserymen and planted in this section have either died out or made very feeble growth. Although some large Texas nuts have been planted here and grown, yet they have either not fruited at all or the nuts have proved no better than our native nuts.

The northern pecan timber is not brash like the southern pecan but is very elastic and tough. An axe-handle made from northern pecan sells for ten cents more than one made from hickory and pecan timber is much sought after by axe-handle makers.

The people in this section have in the last few years awakened to the fact that their swamps studded with pecan trees are about the most valuable lands they possess and many are the inquiries: "Where can we get good budded or grafted pecans?"

The idea of propagating the northern pecan is of very recent origin and while the few attempts at propagation have not as yet met with any very great success, yet we are hoping that the time will be when many acres of our lands shall be set in valuable pecan orchards and our highways lined with long rows of fine pecans, chestnuts, and English walnuts which shall serve the three-fold purpose of beautifying Mother Earth, yielding delicious food, and furnishing a place of rest for the weary traveler.

APPENDIX

REPORT OF THE SECRETARY AND TREASURER

Bal. on hand, date of last report		$ 48.73	
Annual dues and life membership		178.00	
Advertisements in Annual Report		25.00	
Sale of report		18.00	
Dr. Crocker, paid for list of names		2.00	
Prof. Collins, paid for reprints		8.00	
Total receipts		$279.73	
Expenses:			
Expenses of Prof. Collins	$ 20.85		
Printing report and reprints	195.16		
Other printing	38.00		
Postage	35.75		
Typewriting	16.24		
Stationery	4.50		
Miscellaneous	14.30		
Total expenses	$324.80		
Bill receivable		1.00	
Bill payable	22.00		
	$346.80	$280.73	
Deficit			$66.07

Our first annual report, embodying the transactions at the first and second annual meetings, was issued in May, and copies were sent to all members, to the principal libraries of the country, to officials of the Agricultural Department at Washington, and to some state agricultural officials, to several agricultural and other periodicals for notice and review, and to various persons especially interested. Eighteen copies have been sold.

About 1,000 copies of each of the two circulars, "Why Nut Culture is Important" and "The Northern Nut Growers Association and Why You Should Join It", have been sent to members and correspondents, and also revised circulars on the literature of nut growing and on seedsmen and nurserymen.

An illustrated article about nut growing and the association appeared in the Literary Digest and many agricultural and other periodicals have had notices of our association and our meeting.

Besides the regular notices sent to members and papers, different notices and brief statements about nut growing, were sent weekly for five weeks before the meeting to 80 different newspapers published in the country about Lancaster in the hope of getting a good local attendance. The Pennsylvania Chestnut Blight Commission assisted in this publicity campaign by sending postal card notices to about a hundred persons in the eastern part of Pennsylvania who were known to have from a few to thousands of cultivated chestnut trees.

The secretary's correspondence has increased so as to become, if it were not for enthusiasm, burdensome. Often several inquiries a day are received and they come from all parts of the United States and Canada.

The following figures are brought up to date of going to press.

Our membership has nearly doubled since the last report was issued, increasing from 60 to 113. We have lost 1 member by death and 2 by resignation. Our present membership standing at 110..

We have members in 27 states, the District of Columbia, Panama, and Canada. New York heads the list with 37 members and Pennsylvania comes next with 12.

REPORT OF COMMITTEE ON RESOLUTIONS

READ BY PROFESSOR SMITH

RESOLVED:

1. That we extend our thanks to the Mayor and citizens of Lancaster for the welcome and entertainment they have afforded us while here and for the excellent auditorium they have placed at our disposal.

2. That we extend our thanks to Messrs. Rush and Jones and their entertainment committee.

3. That we extend our thanks to the Pennsylvania Chestnut Tree Blight Commission for the attendance of their representatives. We note with keen interest their expressions of hope for the control of this cyclopean menace.

4. That we express our deep appreciation of the great interest and valuable services of Dr. Morris, the retiring President, and Dr. Deming, the Secretary and Treasurer, two officers to whose untiring efforts this Association is largely due.

5. That we express the thanks of the Association to those members and others who have enriched this meeting by their interesting exhibits.

6. That the following letter be sent from this Association to the,—

Secretary of Agriculture,
Persons in authority in the United States Bureau of Plant Industry,
The Presidents of Agricultural Colleges,
The Directors of Agricultural Experiment Stations,
And leading Teachers in Agriculture Colleges.

The Northern Nut Growers' Association, by resolution passed at its third annual meeting, held at Lancaster, Pa., in December 1912, calls your attention to the importance of, and need for, the breeding of new types of crop yielding trees. We now have the possibility of a new, but as yet little developed, agriculture which may (A) nearly double our food supply and

also (B) serve as the greatest factor in the conservation of our resources.

(A) Our agriculture at the present time depends chiefly upon the grains which were improved by selection in pre-historic times, because they were annuals and quick yielders. The heavy yielding plants, the engines of nature, are the trees, which have in most cases remained unimproved and largely unused until the present time because of the slowness of their generations and the absence of knowledge concerning plant breeding.

We now know something about plant breeding, and its possibilities as applied to the crop yielding trees seem to be enormous. They certainly warrant immediate and widespread effort at plant breeding. A member of this Association has shown that the chinquapin can be crossed with the oak; that all the walnuts freely hybridize with each other and with the open bud hickories, a class which includes the toothsome and profitable pecan. There is in California a tree which is considered to be a cross between the native walnut and the live oak. The Mendelian Law in connection with past achievements in plant breeding, and the experiments of Loeb in crossing the sea urchin and the star fish are profoundly suggestive.

The possibilities of plant breeding as applied to crop yielding trees seem to be enormous. They certainly warrant immediate and widespread effort toward the creation of useful strains which may become the basis of a new agriculture yielding food for both man and the domestic animals.

(B) The time for constructive conservation has come. Our most vital resource is the soil. It is possibly the only resource for which there is no substitute. Its destruction is the most irreparable waste. So long as the earth remains in place the burnt forest may return and the exhausted field may be restored by scientific agriculture. But once the gully removes this soil, it is the end so far as our civilization is concerned—forest, field and food are impossible and even water power is greatly impaired. Our present system of agriculture, depending upon the grains, demands the plowing of hillsides and the hillsides wash away. This present dependence upon the plow means that one-third of our soil resources is used only for forest, one-third is being injured by hillside erosion, and only one-third, the levelest, is being properly used for plow crops.

The present alternative of Forestry for hillsides is often impossible because the yields are too meagre. Almost any land that can produce a forest, and much that has been considered too dry for forest, can produce an annual harvest of value to man or his animals when we have devoted sufficient attention to the breeding of walnuts, chestnuts, pecans, shellbarks, acorn yielding oaks, beech nuts, pine nuts, hazel nuts, almonds, honey locust, mesquite, screw bean, carob, mulberry, persimmon, pawpaw, and many other fruit and nut trees of this and other lands.

The slowness and expense of the process of plant introduction and tree breeding limits this work to a few individuals with patience and scientific tastes and to governmental and other institutions of a permanent nature. The United States Government and each state experiment station should push this work vigorously and we appeal to you to use your influence in that direction. You may find material of interest in our published proceedings and in the Fruit and Nut Journal, the organ of the industry, published at Petersburg, Virginia.

REPORT OF COMMITTEE

On the Death of Professor John Craig

Read by Dr. Morris

"The Northern Nut Growers' Association suffered very great loss in the death of Professor John Craig, at Siasconset, Massachusetts, on August 10, 1912.

"Professor Craig, from his many responsible positions in the horticultural world, had acquired a wealth of information which was always at the disposal of his friends and students. His training as a teacher gave such facility in expression of view, that his part in our discussions inspired the audience and called forth the best that others had to offer.

"His type of mind was essentially scientific, and combined with this type of mind there was a rare quality of critical faculty in relation to the relative practical values of horticultural ideas and methods. His interest in the Northern Nut Growers Association belonged to a natural fondness for everything that promised new development, and he established at Cornell University the first course in nuciculture,—so far as we are aware,—that has ever been formulated at an educational institution.

"The personality of Professor Craig, characteristic of that of the scientist, was marked by simplicity and directness of manner, impatience with error due to carelessness or intent, but unlimited benign tolerance of all men who honestly expressed views opposing his own or who made conscientious mistakes. Professor Craig possessed that broad humanity which found quite as large interest in his fellow man as it found in his special study of plants, and his charming personality, strong manly bearing, scholarship, and active interest in whatever engaged his attention at all, will be ever remembered by those of us who had the pleasure and the profit of his acquaintance."

Mr. Littlepage: I would just like to say, in connection with the very appropriate and excellent words which the President used in reference to Prof. Craig, that it certainly meets the most hearty approval of all of us who knew Prof. Craig, that this association go on record in this manner. At the first meeting that was held, by the few of us who met in Bronx Park Museum at New York, to start this organization, you will remember the enthusiasm and the words of encouragement that Prof. Craig gave us at that time. He was there among the first and there was always intermingled with the scientific phase of the subjects that he discussed, the practical, genial good fellowship that made everyone like him; and after all, it is but proper that we stop for a moment and express our deep appreciation. In this life of turmoil and business hustle, I think that we sometimes do not quite realize the shortness of life, the shortness of the time that we have to accomplish any of those things in which we are interested; and it is the men who are giving their time to these scientific subjects, the results of which will inure to all humanity, who are certainly entitled to consideration and a kindly remembrance. That is why it was that I heard with such gratification the words of the President about Prof. Craig.

REPORT OF COMMITTEE ON EXHIBITS

Read by Professor Hutt

By J. G. Rush, West Willow, Pa.

Persian walnuts, four varieties: Hall, Burlington, Nebo, Rush; plate of mixed, imported varieties; Seedling walnuts, Paradox walnut, black walnuts and rupestris, (Texas); two plates Chinquapins; chestnuts, Giant Japanese; shellbarks: LaFeuore, very good, large, Weiker, fair; two seedlings: Paradise nut; two plates filberts; Lancaster Co. pecans; budding knives.

By Wilmer P. Hooper, Forest Hill, Md.

Seedling Persian Walnut; Sir Clair; tree probably fifty years old, vigorous, hardy, annual bearer. On farms of L. J. Onion, Cooperstown, Md. P. O. Sharon, Md. 1911 crop one bushel; 1912 crop one and one half bushels.

Alexis; tree twenty-eight years old; vigorous, hardy, annual bearer, flavor good. Farm of Alexis Smith, Churchville, Md. Crop 1911 one bushel; crop 1912 one bushel.

Sheffield; tree six years old; bought of Hoopes Brothers & Thomas; hardy, vigorous; 6 to 18 feet high; on farm of Mrs. S. T. Poleet, Cooperton, Md., P. O. Sharon, Md.

Smith; tree forty to forty-five years old; large, hardy; on farm of J. T. Smith, Berkeley, Md.

Beder; fifty to fifty-five years old; large, annual bearer; grown from nut on farm of David Hildt, Janettsville, Md.

Hooker; tree twenty-two years old; origin Franklin Davis; vigorous, hardy, annual bearer, hard shell, fine butternut flavor; from farm of Mrs. Kate Hooker, Vale, Md.

By Mr. Knaub.

Shellbarks, five varieties: three black walnuts, two butternuts; one chestnut.

By Mrs. J. L. Lovett, Emilie, Pa.

Six varieties of Persian walnuts.

By E. B. Holden, Hilton, N. Y.

Holden walnut.

Stock Seed Nuts from J. M. Thorborn & Co., 33 Barclay St., New York City.

Juglans Californica, Juglans cordiformis, Juglans Sieboldi, Juglans nigra, Juglans cinerea, Juglans sincensis, Carya alba (shellbark), Carya porcina (pignut), Carya tomentosa (mockernut), Carya sulcata, Corylus rostrata, Corylus amara, Castanea Americana.

By E. A. Riehl, Alton, Ill.

A plate of Rochester nuts and thirty seedlings of it, showing tendency to reversion; eight varieties of shagbark; eight varieties of shellbark; eight plates of Sieboldi; eight plates black walnuts (Thomas); Rush Chinquapin.

Collection of walnuts by Professor Lake, of Washington, D. C.

Royal Hybrid, California x nigra; Paradox, California x regia; Meylan, Glady, Sypherd, Stabler, Milbank, St. Clair.

By A. C. Pomeroy, Lockport, N. Y.

Pomeroy walnuts and seedlings of the original tree.

By T. P. Littlepage, Washington, D. C.

Indiana pecans, six varieties: Warwick, Posey, Major, Kentucky, Indiana, Hodge; Hinton, McCallister hican, Barnes walnut from Washington, D. C., four varieties shagbark.

By W. C. Reed, Vincennes, Ind.
Indiana pecans, thirteen varieties: Luce, Beard, Busseron, Porter, Squires, Kentucky, Hall, Sullivan (2), Warwick, Indiana, Wilson.

By Col. C. K. Sober, Lewisburg, Pa.
Photograph of his chestnut orchard and nursery.

By C. A. Reed, Department of Agriculture, Washington, D. C.
Exhibition jars of Holden walnut, Warwick pecan, Kentucky pecan, Luce pecan, Hales shagbark, Kirtland shagbark, Weiker shagbark.
Exhibition of Squirrel, Perfection and Great Grip nut crackers; White, Jones and Galbreath budding tools.

By Arrowfield Nurseries, Petersburg, Va.
Seedling pecan trees.

THE HICKORY BARK BORER

That our correspondence with the New York State Commissioner of Agriculture, as published in the annual report, has borne fruit is shown by the calling of a conference at the office of the Commissioner at Albany on February 24th, "to consider methods of control of the hickory bark borer".

Among those present were the following:

Frederick Allien, representing Riverdale Park Association.

H. W. Merkel, Forester, New York Zoological Park; representing Bronx, Valley Parkway Commission.

Dr. W. A. Murrill, Acting Director, New York Botanical Garden.

J. J. Levison, Forester, Department of Parks, Brooklyn.

Wesley B. Leach, Consulting Arboriculturist, Boro of Queens.

Clifford R. Pettis, Superintendent of State Forests, Albany.

Dr. E. P. Felt, State Entomologist, Albany.

Dr. W. C. Deming, Sec., Northern Nut Growers' Ass'n, Westchester.

George G. Atwood, Chief, Bureau of Horticulture, State Dept. of Agriculture, Albany.

B. D. Van Buren, Assistant Chief.

Dr. W. H. Jordan, Director, State Experiment Station, Geneva.

George L. Barrus, Conservation Commission, Albany.

S. H. Burnham, Assistant State Botanist, Albany.

Dr. Donald Reddick, Professor of Plant Pathology, College of Agriculture, Ithaca.

Glenn W. Herrick, Professor of Entomology, College of Agriculture, Ithaca.

W. H. Rankin, Conservation Commission, Albany.

P. J. Parrott, Entomologist, State Experiment Station, Geneva.

F. C. Stewart, Botanist, State Experiment Station, Geneva.

After a prolonged discussion the following resolution was unanimously adopted:

WHEREAS, the hickory bark borer is at present extremely injurious and destructive to hickory trees in and around New York City, and has already destroyed and is threatening the destruction of thousands of valuable trees; and

WHEREAS, it has been demonstrated in several instances, on a large scale, that the hickory bark borer can be practically controlled; therefore, be it

RESOLVED, that we hereby respectfully request the commissioner of agriculture to take such steps as may be necessary to bring about the enforcement of the provisions of the agricultural law relative to insect pests and diseases with particular reference to control of the hickory bark borer; and be it further

RESOLVED, that the thanks of the conference are hereby tendered to Commissioner of Agriculture Huson for his courtesies and the calling of the conference.

The following "News Items" of no date, but received in the early part of June, shows what action has so far been taken:

STATE DEPARTMENT OF AGRICULTURE

News Items

Commissioner Huson of the State Department of Agriculture is receiving considerable information relative to a serious outbreak of the hickory bark borer in the vicinity of New York and on Long Island. This borer is the principal cause of the death of thousands of hickory trees. The greatest infested area is in the northern part of New York City, in Westchester County, in Queens and Nassau Counties, though much injury has been observed throughout Suffolk County, particularly along the northern shore of the island. The area of infested hickories is about the same as the territory where the chestnut trees have succumbed to the attacks of the chestnut bark disease. Now that the chestnuts have so nearly disappeared and the fact that the hickory trees are also threatened with entire extermination because of the hickory borer, requests have been made by many citizens, that the Commissioner of Agriculture should exercise such authority as the law gives him in the control of this pest. That the hickory trees that have not been attacked may be saved, or in a very large measure protected has been proven in the Zoological Park and in the parks of Brooklyn. The able superintendents of these two parks have for the last two or three years, been cutting out every infested hickory tree and in that way the other trees are found at this time to be free from insects and they have been saved from certain destruction.

The hickory borer eats its way into the bark of the hickory trees in midsummer. Eggs are laid which hatch and the grubs feed in peculiar galleries in the bark and between the wood and the bark is such a way as to cut off the flow of the sap, thus causing the death of the trees. These grubs are in these galleries at this time of the year and will remain so until about the middle of June. It is, therefore, necessary that the infested trees be cut and destroyed before that time in order to prevent further wide-spread of the insects. The Commissioner has been promised the hearty cooperation of many influential and interested citizens in this movement and agents of this Department are on the ground with authority to inspect trees to ascertain the limit of infestation and they have been directed to mark such trees as should be removed and destroyed at once.

All persons are requested to inform the Department of the location of infested hickory trees and to extend to the inspectors such assistance as may be desired.

Department Circular Number 64 on "Dying Hickory Trees" will be sent to all applicants.

CALVIN J. HUSON,
Commissioner of Agriculture

Albany, N. Y.

MISCELLANEOUS NOTES

Members present :

Dr. R. T. Morris
Mr. T. P. Littlepage
Dr. W. C. Deming
Mr. C. A. Reed
Mr. W. N. Roper
Prof. E. R. Lake
Mr. E. S. Mayo
Mr. A. C. Pomeroy
Mr. J. F. Jones
Mr. J. G. Rush
Col. C. A. Van Duzee
Prof. J. Russell Smith
Prof. W. N. Hutt
Mr. G. H. Corsan
Mr. C. S. Ridgway
Mr. H. N. Gowing
Mr. W. C. Reed
Mr. W. F. McSparren.

Others present :

Mrs. C. A. Reed
Mrs. A. C. Pomeroy
Mrs. J. F. Jones
Mrs. C. S. Ridgway
Prof. F. N. Fagan, Dept. of Horticulture, State College of Pennsylvania
Mrs. Fagan
Mr. Roy G. Pierce, Tree Surgeon, Penn. Chestnut Blight Commission
Mr. Keller E. Rockey, Forester in Charge of Demonstration Work, Penn. Chestnut Blight Commission
Col. C. K. Sober, Lewisburg, Pa.
Mr. S. V. Wilcox, Rep. Thos. Meehan & Sons, Germantown
Mr. H. Brown, Rep. Thos. Meehan & Sons, Germantown
Mr. Wilmer P. Hoopes, Forest Hill, Md.
Dr. A. H. Metzger, Millersville, Pa.
Mr. Amos M. Landis, Lancaster, Pa.
Mr. Blair Funk, Pequea Creek, Pa.
Mr. David S. Herr, Lancaster, Pa.
Mr. Edward Harris, Sr., Cumberland, Md.
Mr. Edgar A. Weimer, Lebanon, Pa.
Mr. Benj. H. Gochnauer, Lancaster, Pa.
Mr. C. G. Reese, Elizabethtown, Pa.
And others.

CORRESPONDENTS AND OTHERS INTERESTED IN NUT CULTURE

ALABAMA

Williams, P. F., Prof. of Horticulture, Ala. Polytechnic Institute, Auburn
Alabama Farm Journal, Montgomery, Ala.

ARIZONA

Biederman, C. R., Garces, Cochise Co.
Huntzinger, H. G., Teviston
Rodgers, Robt. A., Forest Service, U. S. Dept. of Agric., Canille

ARKANSAS

Wilson, B. N., Prof. of Mechanical Engineering, Univ. of Ark., Fayetteville
Powers, R. C., 414 So. Trust Bldg., Little Rock, Ark.

CALIFORNIA

McNeil, Anna, 2154 Center St., Berkeley
Baker, W. A., Greenfield
Leonard Coates Nursery Co., Morgan Hill
Smith, R. E., Agric Exp. Sta., Whittier
Burbank, Luther, Santa Rosa

CANADA

Cleugh, H. H., Castlegar, British Columbia
Secord, Harper, St. Catherin's, Ontario
Porter, W. T., 1520 St. Clair Ave., Toronto
Sager, D. S., Dr., Brantford
Moyle, Henry, 84 Bedford Road, Toronto
Ross, Malcolm N., Dept. Public Works, Regina, Saskatchewan
Saunders & Co., W. E., London, Ontario
Hubbell, W. S., Spanish River Lumber Co., Little Current, Ontario
Peters, E. W., 742 Somerset Bldg., Winnepeg
Graham, Wm., Hagensburg, British Columbia

COLORADO

Bell, Bessie, Miss, 156 S. Sherman, Denver
Morgan, J. W., Dr., 85 S. Penn. Ave., Denver

CONNECTICUT

Cleveland, E. S., Hampton
Buttner, J. L., Dr., 763 Orange Street, New Haven
Jewell, Harvey, Cromwell
Gorham, Frederick S., 48 Holmes Ave., Waterbury
Jenkins, E. H., Agric. Exp. Sta., New Haven
Spring, Sam. N., State Forester, New Haven
Pratt, C. M., Newtown
Hale, Geo. H., Mrs., Glastonbury
Miles, H. S., Dr., 417 State St., Bridgeport
Ives, E. M., Sterling Orchards, Meriden
Cook, Harry B., Orange, Ct.
Allen, G. Wilford, M.D., Boardman, Ct.
Smith, Geo. W., Elm Fruit Farm, Hartford
Lane, W. S., Norfolk
Werle, Jos. A., Merwin's Beach, Milford
Williamson, Robert, Greenwich
Stauffer, W. F., No. 81 S. Burritt St., New Britain
Boyd, Wm. A. Dr., Westport
Lewis, Elmer H., Central Village

Frothingham, Channing, New Canaan
Fletcher, Albert E., Box 67, Farmington
Morre, R. D., Colchester
Wolcott, C. B., P. O. Box 39, Plantsville

DELAWARE

Killen, J. W., Felton
McCue, C. A., Prof., Newark
Cowgill, L. P., Dover
Cannon, Miss Lida, Dover
Kosa, J. J., Milford
Sypherd, C. D., Dover
Whitehead, F. Houston, Lincoln
Studte, M. H., Houston
Knipe, T. E., Delaware City
Dunn, Thos. F., Dover
Webb, Wesley, Dover.

FLORIDA

Simpson Bros. Nurseries, Monticello
Curtis, J. B., Orange Heights
Floyd, W. L., Prof. of Horticulture, University of Florida, Gainesville
Baldwin, Ed. S., DeLand

GEORGIA

Wight, J. B., Cairo
Wilson, J. F., Dr., Waycross
McHatton, T. H., Prof. of Horticulture, Athens
Edwards, B. H., Macon, Ga.
Southern Ruralist, Atlanta

IDAHO

Vincent, C. C., Prof., College of Agriculture, Moscow
Ackerman, W. B., P. O. Box 184, Twin Falls
Hays, L. H., Mace

ILLINOIS

Lindholm, E., 9139 Commercial Ave., Chicago
Stoll, Wm. Paul, 1264 Glenlake Ave., Chicago
Schafer, J. F., Mt. Pulaski
Koonce, Geo. W., Greenville
Watson, Blcomington
Banning, Thos. A., Mrs., Chicago
Graham, R. O., Bloomington
Karstens, Peter J., Chicago
Leslie, A. M., 201 Main Street, Evanston
Fisher, Mr., "Cairo Citizen", Cairo
Endicott, H. W., Villa Ridge
Hektoen, H., Memo. Inst. for Infectious Diseases, Chicago
McVeigh, Scott, 1208 Wrightwood Ave., Chicago
Evans, Homer W., R. F. D. 6, Plainfield

Buckman, Benjamin, Farmingdale
Horner, H. Clay, Chester
Burt, Frank A., 115 1-2 So. Race St., Urbana
Somer, George W., No. 106 N. La Salle St., Chicago
Spalding, C. W., No. 1851 Byron St., Chicago
Strawbridge, A. N., No. 533 E. 33rd St., Chicago
Remley, Mrs. Grace, Franklin Grove
Prochnow, I. W., No. 1127 Second Ave., Rock Island
McFarlane, H. W., Chicago
Graham, W. H., Fort Gage
Fink, Wm. H., No. 4030 N. Pauline St., Chicago
Crandall, C. S., Urbana
Campbell, T. W., Elgin
Badgley, B. H., No. 2241 Greenleaf Ave., Chicago
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Life & Health, Takoma Park Sta., Washington

EXTRACTS FROM LETTERS FROM STATE VICE-PRESIDENTS AND OTHERS

A well-known nut grower in Delaware writes: "We have given the filberts a thorough test and found them one of the most unprofitable nuts ever tested. At one time we had under test about 15 distinct varieties. After several years tests they all succumbed to the blight; a blight that attacked the old wood and killed it. Some of our bushes or trees got as much as six inches in diameter before they were entirely killed back. Possibly by thorough spraying from the setting of trees a success might be made. Some varieties tested were very prolific and of fine quality. We succeeded in getting a fine lot of walnuts from the tree southeast of the potato house by applying pollen. They are as fine and as well filled and as large as any I have ever seen. Several of our crosses had a few nuts this year, most of them are rather thick shelled. The trees though seem to be perfectly hardy. We have several Japan walnut trees bearing this year some of which I consider first class, equal to the best shellbarks or pecans in cracking quality; besides they are so very prolific, producing as many as a dozen in a cluster. We can show specimens from several distinct varieties or types. The Cordiformis seems to be one of the best. We also have some very fine black walnuts. One of our seedlings from the select nuts produces the largest walnuts that I have ever seen. The tree did not have very many on it this year. Several of the other seedlings from the same planting produced fine nuts with good cracking qualities. We also had several pecan trees to bear a few nuts this year; most of the nuts were rather small but of fine quality, very thin shells and well filled. Our Japan chestnuts bore quite full.

I think it possible to produce Persian walnuts successfully in our locality. I also think the Japan walnut offers a good field for investigation.

FROM THE STATE VICE-PRESIDENT FOR COLORADO

Dec. 11, 1912.

So far as I can learn only two attempts have been made in this state to grow nuts. The first one consists in the setting out of about one hundred Jap-

anese walnuts by the Antlers Orchard Co. Their place is on the western slope in the fruit district and I am informed that the first winter the tops were killed but new shoots put out from the roots and the trees did well this year.

The other attempt is one I made last spring. I set out a few pecans tree as an experiment near Colorado Springs. Six of the seven trees lived and put out some leaves but did not make much growth. If they survive the winter I purpose planting more pecans and some other nuts,—chestnuts, black walnuts and possibly Persian walnuts.

Hilton, N. Y.
Nov. 29, 1912.

Dear Sir :

In reply to your inquiry I am inclosing notes on walnut culture in this locality. This noble fruit is not generally known here. I do not know of more than twelve or fifteen bearing trees in my county. Of these all are without doubt seedlings, and are located in places where the peach will thrive. The soil in which they grow is varied: Dunkirk fine sand, Dunkirk silt loam, Ontario fine sand loam, and Ontario loam. (See soil survey of *Monroe county*, N. Y. U. S. Dept. Agriculture.) The altitude is comparatively low. The highest point in the county is only 682 ft. above lake Ontario, and the average elevation is not more than 300 ft. The "Holden" walnuts are growing at a still lower level. This tree, considering its surroundings and location, had a good crop this year. Standing on the lawn uncultivated and unfertilized, hemmed in on three sides by other trees, it gave us at least three bushels of fine nuts.

The wood showed no injury after last winter's intense cold. Growth started in the spring just as the apple blossoms came out. The catkins are very large, at least much larger than those on the other trees we have, and hang on longer. One of our trees loses its male blossoms before the female bloom appears, but the "Holden" is the last to lose them. About half of the clusters of fruit have two or three nuts in them. We began harvesting the nuts Sept. 15th, just four months from the blossom. The dropping continued for a month, prolonged on account of lack of frost.

Last week the Rochester Democrat and Chronicle reported the appearance of the first load of English walnuts ever brought on the local market. They were grown on fifteen year old seedlings, at East Avon, N. Y., by Adelbert Thompson. His orchard is said to contain 200 trees. It seems very probable that the next twenty-five years will see the development of Persian walnut growing, to commercial proportions, in those localities in the state where the peach will grow.

I had a little experience last spring with southern grown walnut trees. Last spring I received from Louisiana eleven trees of the "Holden" variety grafted on black walnut stocks. They were fine trees, the largest at least eight feet tall. Six of these I set out in my own orchards and gave them intensive care and cultivation, but alas, growth was weak and at last they died. If I were to deduce any conclusions it would be that there is too great a difference between Louisiana and New York conditions.

FROM THE SECRETARY OF THE MINNESOTA STATE HORTICULTURAL SOCIETY

Dear Sir:—

I am addressing you as secretary of the Northern Nut Growers' Association in hopes that you can refer me to some one, perhaps a member of your society, in this part of the country to whom we can appeal to take part at the coming annual meeting of this society as champion of nut growing. While in our state we cannot successfully grow pecans, nor perhaps the sweet chestnut and some other nuts, yet some varieties do well with us and a larger interest in their growing should be stimulated.

Yours very truly,

A. W. LATHAM, Sec'y.

Members of the Northern Nut Growers Association, and others are cordially invited to visit the groves and nurseries on the Pomeroy Farm.

Convince yourself, as words and pictures convey but slightly the beauty and profit of these hardy trees.

Farm located on the West Boulevard two miles from city limits of Lockport.

Buffalo and Niagara Falls but a short trolley ride, or a fine forty-five minute Auto trip through a beautiful country and good roads.

Send for illustrated booklet.

Young HARDY POMEROY—Persian (English) Walnut Grove, in bearing. Pomeroy Farm, Lockport, N. Y.
(Peach trees used as fillers.)

ALBERT C. POMEROY

Lockport, N. Y.

NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

FOURTH ANNUAL MEETING

WASHINGTON, D. C.
NOVEMBER 18 AND 19
1913

NORTHERN NUT GROWERS ASSOCIATION

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WASHINGTON, D. C.
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CONSTITUTION AND RULES OF THE NORTHERN NUT GROWERS ASSOCIATION

Name. The society shall be known as the NORTHERN NUT GROWERS ASSOCIATION.

Object. The promotion of interest in nut-producing plants, their products and their culture.

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the approval of the committee on membership.

Officers. There shall be a president, a vice-president, and a secretary-treasurer; an executive committee of five persons, of which the president, vice-president and secretary shall be members; and a state vice-president from each state represented in the membership of the association.

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the subsequent year.

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

Discipline. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

Committees. The association shall appoint standing committees of three members each to consider and report on the following topics at each annual meeting: first, on promising seedlings; second, on nomenclature; third, on hybrids; fourth, on membership; fifth, on press and publication.

Northern Nut Growers Association

FOURTH ANNUAL MEETING

NOVEMBER 18 AND 19, 1913

At Washington, D. C.

The fourth annual meeting of the Northern Nut Growers Association was held, in conjunction with the meetings of the American Pomological Society, the Society for Horticultural Science, and the Eastern Fruit Growers Association, in the new National Museum building at Washington, D. C., during "Fruit Week," November 17 to 22, 1913, the meeting of the Association being on the 18th and 19th.

The first session was called to order at 11 A. M. in Room 3. In the absence of the President the chair was occupied by Professor W. N. Hutt of North Carolina.

The Chairman: Ladies and Gentlemen: If you will come to order, we will begin the meeting of the Northern Nut Growers Association. It is unfortunate that our president is called away on important business. He has asked me to take his place and we will do the best we can. I will ask the secretary to read a communication.

The Secretary: I have this telegram from Mr. Littlepage, our president:

"Please express to the Northern Nut Growers Association my profound regrets that I cannot be with them. No organization has ever been formed that contained finer and more sincere men than ours. I invite the Association to come to Indiana next year. I will take you along the banks of the Wabash, the Ohio and Green River, where the pecan trees grow so big that the sun has to go around. I send best wishes for a successful meeting."

The Chairman: Mr. Pomeroy has kindly consented to give us a talk on walnuts.

EXPERIENCES AND EXPERIMENTS WITH THE PERSIAN WALNUT

A. C. Pomeroy, New York

When our secretary asked me to prepare a paper on this subject, I thought it would be very simple, but after making a beginning I

found that about all I knew on nut culture was my own experiences —successes and failures—covering a period of about twenty-five years.

During the past year better data have been kept of the behavior of the Persian walnut trees under my observation, than in former years.

Hereafter it is my intention to keep a more detailed record of the time of the appearance of the nutlet blossoms of each tree, which is of the utmost importance to those interested in the growing of the Persian walnut in the North and East.

In order to keep a better record of each tree I have numbered the old original trees, planted by my father, from 1 to 7.

Nuts from each tree are here in jars numbered to correspond with the trees from which they were gathered and may be compared for variation in size, shape, thinness of shell and flavor.

It would be impossible to keep an exact record in pounds of the yield of any one tree per year. One thing against any such record, is that many visitors come to our farm every year to see the walnut trees and the pockets of some of them look suspiciously bulky on leaving. (An ordinary coat pocket will hold a quart, an overcoat pocket more than that and there are only thirty-two quarts in a bushel.)

The new orchard is just coming into bearing. At one end of it there is an old black walnut tree, and the young Persians that were planted near this tree began to bear first. Near the center of this eight-acre orchard we planted a butternut tree. This will, I think, help to fertilize the pistillate or nutlet blossoms on many of the trees.

Of the original trees five stand where they can have care and good cultivation. The other two were put in the lawn very close to some old shade trees where they can not be cultivated and are kept pretty well in the shade. The five cultivated trees produced this fall over twenty-three bushels. The nuts were measured on November 10 when there were twenty and a half bushels. The snow was so deep the other few bushels could not be gathered.

Besides the walnut trees mentioned there are perhaps twenty-five more planted in small plots about the farm. Nuts from some of these young trees are here and comparisons may be made with the nuts from the old trees.

To get an idea of how the English walnut has done in some parts of western New York the following replies to enquiries are quoted.

Wilson, one tree thirteen years old, one and one half bushels.

Sybrandt, has twenty-five or more trees thirteen years old, some trees a bushel, others over a bushel and a half. Eighme, one tree fifteen or sixteen years old, one bushel. Trippency, one tree fifteen or sixteen years old, two bushels.

Nuts from some of the old and young trees were weighed. The results were somewhat surprising to me.

Tree No. 1 S. R. Long, well-filled nut, 48 to the pound.

Tree No. 1 N. R. Nut slightly pointed, well filled, 40 to the pound.

Tree No. 2 N. R. Nut nearly round, well filled, 37 to the pound.

Tree No. 5. Annual bearer, 64 to the pound.

The weighing was done on a druggist's scales about two weeks after gathering.

Those of you who have not seen a Persian walnut tree in full foliage, have something to live for. Imagine a tree, that was a nut in the spring of 1877, its branches now spreading full fifty feet, its topmost bough fully that far from the ground, its trunk measuring seventy-six inches around, well above the earth.

Imagine such a tree in its foliage of dense, dark glossy green, its branches loaded with fruit, sometimes actually touching the ground.

The question is sometimes asked what is such a tree worth for cabinet use? I don't know, and I don't care. What I do know is that those five trees produced well upward of forty dollars each this year.

Our markets in western New York are good. The folks that use nuts as a daily food have increased greatly in the past few years. Niagara County has three cities, Erie County, adjoining, also has three cities. The population of Buffalo is about 450,000; improved highways and gasolene trucks have put us within an hour and a half of all these six cities.

While there are hundreds of young Persian walnut trees, just coming into bearing, in some of the counties of western New York, the supply of home-grown nuts will probably never fill the demand.

Professor Lake paid the farm a short visit this past summer and told of his grafting. I think he said he had a loss of 90 per cent. We beat that a little as our loss was 100 per cent.

The failure in grafting was due, I think, to the scions not being cut early enough.

Budding in August was done by budders expert with fruit trees. A Jones budding tool was used. Nearly all the buds took.

We do not have much trouble with disease or insects.

We have had no trouble to speak of with worms. About ten years ago a few nests of the tent caterpillar were cut off and burned.

Some 18 or 20 years ago all, or nearly all, of the nuts dropped in June. I do not know what was the matter.

In 1906 the ends of some of the branches on the older trees turned brown and died back a few inches.

These were cut off and burned. We had but few nuts that year.

In fertilizing have used barnyard manure. When it was used it was at times applied too freely, perhaps, as some of the young trees put forth a growth of six feet in one season. I do not think it well to force them too much. The fertilizing should be done in the winter or early spring.

Trimming may be done at any time a branch appears that needs removing.

There is one pretty good sized tree on the farm with black walnut stem and Persian walnut top. Some horticulturists seem to think that this kind of a tree is hardier. My observations are that there is not a bit of difference. This tree and another on a near-by farm are the only two I know of with a black walnut stem and a Persian top, in my section.

The U. S. Department of Agriculture has issued a bulletin "Soil Survey of Niagara County, N. Y." By referring to this, I find that the soils that have produced thrifty, and prolific Persian walnut trees are, Dunkirk loam, Dunkirk sandy loam, Dunkirk silt loam, Clyde sandy loam and clay loam.

The winters of western New York are frequently quite severe. The winter of 1911–12 was a very severe one, zero weather prevailing most of the time and frequently it was way below zero for days. No injury was done to the Persian walnut trees and a good crop of nuts was harvested in the fall of 1912.

In May, 1913, on the nights of the 11th and 12th it was so cold that ice formed an eighth of an inch, or more, in thickness. The staminate catkins on the Persian walnut trees were fairly well developed and it was thought the nuts were gone for this year surely, but the last of May the pistillate blossoms came out, the staminates matured and the results have already been told you.

I think that Persian walnut trees pay better than apples, and that there is no danger of an oversupply.

The cost for labor in caring for the trees and in harvesting the crop is very much less than for any other fruit crop. No spraying and no picking are necessary.

The cost of production is slight, yet the demand and prices for this nut have been steadily increasing for several years.

The Chairman: I would like to have a good discussion of this paper, because it seems to me that in all the activities of the Northern Nut Growers Association the Persian walnut offers the highest possibilities. The Pacific coast people and southern people have always thought that only the hickory or black walnut could be raised in the northern parts of the country, and now we find that the Persian walnut also does well there. The Secretary has sent out a letter recently asking for information about the Persian walnut trees in the vicinity of each person addressed. This letter was gotten out for the reason that in the culture of the Persian walnut the Pacific coast people have distanced us, and it is probable that we have not learned the possibilities of these splendid nuts in the East. We have a few very fine varieties of these eastern nuts, and it looks as if, by use of these varieties, the eastern part of this country can produce these nuts in as large quantities as the western. Mr. Pomeroy originated the walnut bearing his name, and we have another nut that offers very good promise, and I believe the originator is here this morning. Mr. Rush we would like to hear from you.

Mr. Rush: I am satisfied that Persian walnut culture can be made just as profitable on the Atlantic coast as on the Pacific and in France. We have varieties that have stood a temperature of twenty-three degrees below zero.

I have discovered another variety in Lancaster. This tree was brought in from Germany about thirty-five years ago and it has turned out to be an extremely valuable variety. I have seen these nuts selling in the open market at fifty cents a pound. As regards propagation of the Persian walnut, of course the black walnut is the most common variety on which to propagate. Another stock is the Japan walnut, in a sense better than the black for grafting. It has a better lateral root system and is not so fierce in going down to the center of the earth. Its root system is magnificent. Several trees budded on this stock a year ago last August and transplanted in November the same year, had a growth this summer of over six feet from the bud, showing that there must certainly be remarkable vitality in the Japanese roots. I have a young tree thirteen years old budded on black walnut that produced twenty-one nuts this summer. I have a seedling about ten years old which didn't have one catkin bloom. But a tree of the Rush variety, so named for me

by Mr. Jones, the first propagator, stood about forty feet away from the first, and at the end of the season this seedling tree produced sixty finely developed nuts. This seedling tree, however, had a great many pistillate blossoms, which received pollen from the neighboring variety that was prolific in staminate bloom. It would seem to be an advantage for a seedling Persian walnut to have a good pollenizer in its company.

Professor Smith: I was struck by Mr. Pomeroy's statement that after apparent killing of the staminate bloom by frost the pistillate blossoms appeared and he had a crop. Evidently he got fertilization from some outside source. The Persian walnut in the eastern part of the United States is like many other trees in that its trouble does not arise from susceptibility to winter cold, for when it is dormant it appears to stand great cold. The trouble with the Persian walnut is its tendency to start growing at the first approach of warm weather and if the cold comes later it may kill the tree. Mr. Pomeroy's farm there near the shores of the lake has an immunity from sudden changes of temperature and therefore his trees are not likely to make growth which will be caught by late fall or early spring frosts. Unquestionably he can grow Persian walnuts better there than can be done five hundred to a thousand miles further south. It is also a well-known fact that one of the best of peach and apple regions is along this lake shore. There are many other Persian walnut trees growing in different localities east of the Mississippi, but nobody seems to think them worth propagating because they winter kill at times. Yet seedlings of the hardiest trees often do it. A new variety of the tree has been discovered which is wonderful in that, whereas the ordinary Persian walnut tree comes into leaf rather early, this tree comes into leaf in June when cherries are ripe. I have seen similar trees in France. I have no doubt there are ten or fifteen different varieties of this tree growing unappreciated in this part of the country. These particular trees we do know about happen to belong to gentlemen who are propagating them for our benefit and we owe them our thanks; but I have no doubt there are many other trees equally as valuable growing in the Eastern States. I have no doubt that the experience of Mr. Rush could be duplicated, in discovering right near him in his own town something better than he had ever known before. We need reports on all these trees.

Mr. Rush: In connection with Mr. Smith's remarks as to late vegetating varieties, it may be that this feature is not altogether desirable. I have been in correspondence with a gentleman in Col-

fax, Washington, who has some late vegetating varieties and he tells me that he lost his whole crop. They were caught by a frost at the end of the season before they had fully matured.

Mr. Davis: Mr. C. A. Sober has, on his farm in central Pennsylvania, about five hundred Persian walnut trees and has had them for ten years. He has not been able to get a nut. Every year they freeze back. The trees live but they freeze back. I don't know whether this is because they start too early or not.

Professor Smith: I do not know that there is any better nut than these which we are now propagating, but I think the chances are ninety-nine to one against our having found the best walnut trees for this region.

The Chairman: I think Professor Smith's point is well taken. We are just starting in this business. I want to get the experiences of men from different parts of the country. Is Mr. Stabler here?

Mr. Stabler: Thirty years ago three trees, probably seedlings were planted in our neighborhood. One is on my father's farm, one is on my uncle's farm, and one is on our farm. The one on our farm, I think, has never borne a nut. My uncle's has borne many times, although an apple tree and a cedar tree are very near it. This walnut tree comes out so very late in the spring that no spring frost catches it. It is in Montgomery County and we often have late spring frosts there. The nuts are all ripe in the fall too before the frost comes.

Professor Smith: Mr. Stabler told me that this is the fifteenth successive crop from this tree.

The Chairman: This is certainly a very important point—the maturity of these trees. It is the general impression that the Persian walnut will not mature in certain sections of the country, but as a fact there are certain varieties that will mature anywhere in the country. We have similar evidence in the experience of the pecan growers. The Indiana pecan is dormant later than the southern varieties. This is true of the hardy peach also which comes out later in the spring and is ripe sooner in the fall than the southern varieties. These seem to have accommodated themselves to the climate.

Professor McHatton: In Georgia we are prone to be hurt by the late spring frosts—that is our great trouble. The other day there was sent into the office a number of specimens of the Persian walnut, said to be from a seedling grown at Sharp, Georgia, in the apple country just below Chattanooga, at an elevation of eight hundred to a thousand feet, and it gets cold up there—they have heavy

freezing every winter. This tree began bearing at seven or eight years, the owner said, and has borne a crop every year for the past seven or eight years, and he had several losses of fruit crops from late spring frosts during that period. The nut was very well filled and of fair size. If any one is interested sufficiently and will write to me as soon as I get back to the college I will send the name of the grower. I do not recommend it as I have never seen more than a dozen of the nuts. This was of interest to me, because I have not been recommending the Persian walnut there on account of the late spring frosts, but now it looks as if there was a chance of our getting into the walnut game ourselves.

Mr. Pomeroy: A prominent expert who came to the farm once said to me that the Persian or English walnut came to this country through two routes: one through Greece, Italy and Spain, and taken by the Spaniards to Mexico and southern California, and the other route through Germany and England into the United States from the north. He said he would rather have his walnut trees come from the northern route trees than the southern.

Professor Smith: Any one who has a good tree ought to write to our secretary. I hope everybody will report these trees. The information will be published in bulletin form and sent out to every member of the Association. I fully believe that this information gathered and disseminated will greatly assist in developing the walnut industry in the eastern part of the United States.

Mr. Frost: Mr. Pomeroy said that the pruning might be done at any time of the year. I pruned a walnut tree one spring and it very nearly bled to death.

Mr. Pomeroy: It seems to me that I have always pruned at any time. It might be that when the sap is just nicely started—just before the tree starts and the buds swell—it might not be wise to do that. I suppose that the nut trees might bleed then the same as grape vines and certain other plants and trees. I thought it never did any harm.

Mr. Frost: It very nearly killed mine. They were big trees, too.

The Chairman: I had just such an experience as that with grape vines. We found that if grapes are pruned at a certain time in the spring they will bleed profusely, and sometimes actually bleed to death. I never had any experience with walnuts, but with vines we prune in the fall just as soon as they are dormant. At that time the energies of the plant are at a minimum and you can prune more safely than at any other time. As we go on toward

spring the moisture becomes greater and the sap starts, so if you prune late in the spring there is great danger of injury to all plants. If you prune in the fall you have no trouble.

Mr. Wile: I would like to know if any one has had experience with California varieties here in the East.

Professor Van Deman: Professor Close has had more than any one else. I have also heard of some in Florida.

Professor Lake: We have had three years' experience; we have had also the experience of others who have had them a longer time than that. Some three years ago we grafted a number of California varieties on the eastern black. In view of the eastern conditions, these are all making splendid growth—some of them made a three-foot growth last year, some a five and one-half foot growth this year. They went through last winter splendidly; they are holding back finely in the spring and we had no trouble with spring frosts on the grafted portions, even though many of the seedlings were injured.

The Chairman: Will the Persian walnut fertilize itself under eastern conditions?

Professor Smith: I think we will have to trust to outside fertilization by the black walnut or butternut. They all bloom at the same time. One fertilizing tree will do, but it is better to have more than one because sometimes it might turn out that the staminate catkins came a few days too early or too late to fertilize the nut. The more trees you have, the better the chances; the more trees in a group the better. The reason a five or six-year-old Persian walnut tree does not bear many walnuts is that there are no staminate catkins. It takes old wood to produce them. There is not enough old wood.

Mr. Stabler: The Stabler walnut which I have just mentioned, bloomed from the tenth to the twenty-fifth of June. The black walnuts of that neighborhood all came out from a month to six weeks earlier than that, and not a single black walnut tree had blossoms on in that neighborhood, nor a single Persian walnut at the time the Stabler tree blossomed. I believe I am fairly well acquainted there and there was not a single other tree had catkins on at that time, and yet that tree bore a good crop of catkins and a large number of pistillate blossoms and later a good crop of nuts which is fairly good evidence that it must have fertilized itself.

The Chairman: We would like to continue this discussion, but we have another paper that bears on the subject, and I think it will bring out some points in connection with it.

FORAGE NUTS AND THE CHESTNUT AND WALNUT IN EUROPE

J. Russell Smith, Virginia

The great task of American agriculture is to feed our beasts. Approximately nine tenths of the proceeds of American agriculture goes to nourish the quadruped, and man eats the remaining one tenth; therefore, if we want to get clear of the possibility of a crop being overproduced, let us grow something the beast can eat. To say that we will never overproduce food crops for man is ridiculous. It is quite possible, for instance, that we may produce too many Persian walnuts for man's food, but the tree that will produce nuts to feed the beasts is on a firm basis. Pigs are going up and they are going to stay up. If we can get something that will suit Brother Pig we are on a perfectly safe basis, and that is the basis of the chestnut industry in Europe. In large sections of France, from Switzerland to the Atlantic, there are thousands of acres of chestnut trees—a great forage crop. In a few districts is looks like a forested country, on account of the heavy chestnut tree groves. The tenant who takes a farm has certain restrictions placed upon him in the removal and use of the crop. He is not allowed to remove the chestnuts in France. The tenant who takes the farm, signs a contract that he will not sell the chestnuts but will feed them to the pigs so the soil may not be exhausted. They gather them carefully and use them in a number of ways. They make the main bread supply of the people. I have eaten chestnut cake. It is not bad. They treat it exactly as we do corn cake. When they can afford something better, they do so.

At harvest time the chestnuts are put in drying houses, a fire is built under them and after they are thoroughly dried they will keep indefinitely. We find them on the market as dried chestnuts; and I have seen people eating them raw in June of the year after. Chestnut meal is a standard article of consumption and the price is regulated by the price of cornmeal.

I have seen considerable areas planted out regularly in rows of young trees, and alongside of that older ones. They plant on perfectly fine, level ground hundreds of acres of chestnut groves and we find these groves anywhere from twenty-five to one hundred years old. They are very valuable property for the reason that when old there are many cords of wood to the acre, and chestnut wood is valuable.

They have a disease over there called inky root consequently new plantings have largely ceased, though there are some going on. A great reason for planting is that timber means an increase in the value of land. A man who has an old chestnut orchard has land that is worth two hundred dollars an acre for wood alone and the temptation is very strong to sell off the timber and get the money, which process is going on faster than the setting of new orchards. These orchards are on high class agricultural land.

It is quite different in Corsica; the country there is very broken and rough. Some of the hills range up to 6,000 feet, and for a belt of 2,000 feet the chestnut forests are continuous and villages numerous. This island supports a dense population. The principal industry consists of gathering the chestnuts, and for a few weeks the people are very busy putting them away for the year's supply and sending them to market. I stopped at the home of the mayor of a little town and he went back in the barn where he had a bin full of dried chestnuts. He fed some of them to my horse. It is their one crop. Many people have nothing but twenty or thirty or forty acres of chestnuts and a little garden—a little garden made by retaining walls making a terrace that must be tilled by hand. That is the whole sustenance of the people. The value of the land is usually estimated on a tree basis, and very seldom put on a land basis. The value of land covered with trees is from two hundred to three hundred dollars an acre, and land along side of this without trees may be worth but ten dollars. The value of the chestnut trees for wood forms a large part of the sale value. There is some good pasture under these trees.

The renewing of these groves is perfectly systematic. The old trees, having attained their full size, meet overhead and right alongside of them are planted new trees, which under such circumstances make a very poor growth. The young tree may get as high as this room in ten or fifteen years, and the old tree being worth ten or fifteen dollars, is then cut down (in that country if you want money cut down a chestnut tree). The young tree takes the place very soon, and once established a chestnut orchard lasts indefinitely. Sometimes they plant the young tree beside the old one, ten or fifteen years before the old tree is to be cut down.

The contrast between the populous villages of Corsica and like portions of the Appalachian hillsides is striking. The inhabitants of the latter cut down everything, plant corn and in two or three seasons the rain simply carries the earth away and the farm has to be abandoned. In contrast to that the orchards of Corsica have

been there for many centuries. I asked one man how long this thing had been going on. He said "two hundred, three hundred, five hundred, one thousand years, always." Nobody knows when they began to grow chestnuts. How the land continues to grow them is more than I can understand. As an example of permanent agriculture, that has everything I have ever heard of beaten out. Those people had not fertilized the trees, as it would be a physical impossibility to carry anything up those slopes; everything comes down. They have been taking off wood and nuts always, nothing has gone back. I have not been present at harvest time but I have consulted with the representatives of the Department of Agriculture in France and they tell me this land produces a ton to three thousand pounds to the acre, with the big years doubling that and the little years halving it. This without taking anything away from the land apparently. The land is as good as when they began, and is supporting a dense population and has for centuries.

Another forage nut which struck me as even more important than the chestnut, because of its much wider possibility in America, is the acorn. I have been through considerable areas in Portugal where they didn't care whether they had a cork tree or an oak. Land with such trees is worth from one hundred to one hundred and fifty dollars per acre. They assured me that the acorn oak forest was as valuable as the cork forest. Some of this land is wheat land. They will let an oak tree stand right in the middle of a field where the cultivation of the ground improves the tree. After the wheat harvest the hogs fatten on the acorns.

The evergreen oak of southern Europe is highly prized for its acorns. I have seen large areas of bearing trees. I have been told time and again that they bear at a comparatively early age. The oak is capable of grafting, about as easily as the chestnut. I have seen them grafted, all the way from those of this spring up to three hundred years old. The number of trees grafted is small, but that in no way affects the possibilities. Certain varieties are prized as much as chestnuts, or even more, and the price of acorns is set by the price of chestnuts, just as the price of cornmeal sets the price for chestnut meal. I never got crop records for a solid acre of oak trees, but the performance of individual trees gives rise to the belief that the acorn crop in Europe and America is worthy of careful study. I saw a tree—a single tree—that I was assured bore more than twelve hundred quarts in a single year, thirty-seven bushels. It is hard to get the yield in a large forest, but this tree was alone. Its sweep was seventeen yards, its yearly production seemed to aver-

age over twenty bushels, which was worth as much as an acre of corn in any of our states. Wherever I found an isolated tree, I found its production to be surprisingly large, and I got my information from a variety of sources. It seemed to be one of the most important forage trees.

As to the Persian walnut, it is reported to be a small nut of almost no value in its wild state. It grows around the world between the belt of the orange and the belt of the white pine. It is unknown as a crop in large areas in Europe, where it might be grown successfully. In Italy there is only an occasional tree, and it is not grown much in Portugal or Spain.

It has centers in Europe as crops have in the United States and for the same reason—someone started the industry. The activities of Mr. Pomeroy have stimulated its growth in his immediate locality. When any one succeeds in a certain line, we find people about him taking up the same line and they conclude that this product can only be produced in that particular locality. This is usually not so at all. The thing that happened was that some one showed them that this soil would produce this thing. Near Naples there is a walnut boom. The value of the walnut as a crop is shown by the fact that market gardens producing three crops a year under irrigation are being planted to English walnuts. I have been told time and again that this is a very profitable crop. In this walnut district they have planted whole hillsides to olives and walnuts alternately, sometimes mixed up, sometimes twenty acres solid. In some places they can only be cultivated with the hoe, a very distinctly un-American job, and yet the English walnut seems to pay the people under those conditions of labor. It is spreading over that peninsula and you find it spreading in the lowlands. They trim the tree up to twenty-five feet, so that teams can drive below.

There are two important walnut areas in France; at one place an old crank named Mayette about two hundred years ago found a good walnut and he grafted some and planted out an acre or two, and his neighbors planted some, especially when his acre or two began to grow, with the result that the territory around that old man's planting is the center of the production of the Grevoble walnut. A little strip, on the foothills of the Alps and along the Isère river is sprinkled with walnut trees. They are now planting these trees in the midst of the best vineyards. In a field of wheat oftentimes you will find rows of little walnut trees. There are some orchards of Persian walnuts in this locality but I think no orchard has over five acres. They have come to grief along a line that is

common to most people, that of overcrowding. It takes a great deal of nerve to plant a nut tree sixty or seventy feet from the next —it looks as if it were wasting the land—and they have planted them so close that the tops of the trees and the foliage form a flat level green surface, and the sun shines on a very small part of each tree instead of all round and over it as it should.

The other walnut district is one more suggestive to me. I doubt if even those who have trees to sell are justified in advising the farmers to plant solid fields of walnuts, but we can recommend a row of them around fence rows and round the barn. I traveled a good many miles through the western part of France, from Lyons to Bordeaux, and I have seen thousands of trees, but I have not seen any orchards. They put one tree by itself and they raise wheat close up to it. The fertilization and cultivation help the walnut and make it produce a better crop. Those well-fed trees with plenty of sun, air and plant food are distinctly superior to the other trees. A good walnut tree rents for as much as an acre of ground. It is the product that is received without labor that appeals to me, and as the trees produce well, there is sometimes seven or eight dollars worth of profit to each tree, and the landlord is in the position to command most of the seven or eight dollars because he furnishes the trees. If a 50-acre farm with fifty nut trees stood on one side of the road and one of equal area without any trees on the other side, the one with the trees would rent for twice as much. A good tree will occasionally produce three or four hundred pounds of nuts, especially a fine tree out by itself. Once in a while we find a grove of them but more often there are six, seven, eight or more trees scattered round the house. The combined result of that industry produces millions of dollars worth of nuts.

If there are any questions, I shall be glad to answer.

Mr. Evans: Can the pecan be used as a forage crop for pigs?

Professor Smith: I don't think we are willing to let him have them.

Mr. Evans: Would a pig eat them?

Professor Smith: Observations show that the pig will eat them if you give him a chance; he will eat with great gusto the hickory nuts and a grown hog will also crack black walnuts; the pecan he simply grinds up. I suggested the pig as a way out of the problem of overproduction; the pig wants the products when we don't.

Mr. Storrs: I come from a country where we grow the pig on

corn, and it is hard for me to believe that he will get fat on acorns and chestnuts.

Mr. Lee: I also would like to ask whether a hog will get fat on acorns. I had an experience this fall; a man on my farm had some pigs and he kept them in a pen and fed them corn. I was going to begin to feed my hogs, but I had a woods and I said let them eat the acorns. At the end of a month they had eaten the acorns but they were not as fat as they had been at the beginning. They had worked so hard to get the acorns that they had worked off all the fat.

Professor Smith: There are two hundred thousand hogs on the job in the federal forests today. The Portugese pig in the spring is a lamentable looking object. The method is to keep him alive until acorns get ripe and they count on a pig multiplying himself one hundred to two hundred per cent in the short season from the beginning of September to the first of the year. They keep him ordinarily eighteen months; they carry the spring or fall pigs through one winter, and at the beginning of the fattening season a pig that weighs fifty or sixty pounds is counted on, in the short time when acorns can be picked up, to jump up to one hundred and fifty or two hundred pounds. There is much evidence on both sides of the Atlantic to the effect that acorns fatten hogs if the supply is good.

PRESENT STATE OF THE CHESTNUT BLIGHT

J. Franklin Collins, Washington, D. C.

I presume that all of you who have any interest at all in the chestnut know considerable about the blight which has been killing these trees in the northeastern part of the country, so I will say nothing whatever about the general features of the disease but confine my talk to those points which have assumed, within a year, some special importance from the point of view of fighting the blight, or related topics.

Perhaps the first thing that I can allude to is the discovery of a certain disease in China which, at the time, was supposed to be identical with the chestnut disease in the northeastern part of this country. I say "supposed" because we had no positive knowledge at the time that it was the disease. Specimens were sent to this country by the agricultural expert, Mr. Meyer of the Department of Agriculture, for examination. Cultures and inoculations were made by the pathologists in the Bureau of Plant Industry and all of the tests that could be applied showed it to be identical with our American disease.

Mr. Meyer's report upon this disease, as he found it in China, has some points which may be of interest to you. He said the disease apparently had been there for many years, as the lesions of the disease showed if they were examined carefully. The fact that it has been there for many years is, I think, questioned by no one at the present time. Its growth in China seems to be somewhat different, in fact in many cases quite different, from the growth on the American and the European chestnut trees. It is rather of the type that we are familiar with on the resistant Japanese trees. Moreover, it appears on some of the trees as shown in the photographs which I will pass around. The appearance of the disease more closely resembles, in some ways, what we are familiar with in the European apple canker as it appears on the apple trees. I think those who are familiar with the apple canker will notice the resemblance, in at least one or two of these photographs. Now, I don't mean by that that it is the same as the apple canker, but I do want to call your attention to its appearance in these photographs, and at the same time, to tell you something that Mr. Meyer wrote about this disease as it appeared in China. He said he found no trees that were absolutely killed by the disease. This may mean, and probably does, that the Chinese tree is resistant, to a certain extent, to this disease; that is, it shows a certain amount of resistance, much in the same way that the Japanese chestnut tree does to the disease in this country.

For some years (as some of you will remember, I think) there have been two different views as to the origin of this disease. One is that it is a native fungus which, for some reason, has assumed a parasitic form; the other that it is an imported disease. The principal reasons for the latter view are that it spreads in this country on the American chestnut in much the same manner that other imported diseases have spread on other plants. The fact is that this disease (so far as we can find absolutely identical with the American form) has been found in China; about this point there is no doubt at all, and I think we can safely say, although we cannot absolutely prove it at this time, that the disease in this country was imported from the Orient. What bearing this will have on the question of control of the disease in this country remains to be seen.

Have we any chestnuts which show immunity to this disease? The American chestnut is subject to it in its most virulent form. There are of course a number of varieties of the American chestnut which have been cultivated. Of these the two which I have seen most of are the Hathaway and the Spineless. Both of these are

subject to the disease in the ordinary form. The American varieties which have been originated within a few years, the Boone and the Rochester, I am not prepared to say anything about at the present time. The resistance or immunity of these varieties has not been determined so far as my own work is concerned. Of the European varieties we have a great many and they produce, as a rule, the large chestnuts of the market and are known under various names. Some are scions of named varieties and I will mention some of the more prominent. The first and best known, perhaps, is the Paragon chestnut. This is susceptible to the disease and takes it in almost as violent a form as does the American, and so it is with the Ridgely, a nut which originated near Dover, Delaware. The Dager and the Scott also take the disease, and so do many of the so-called French varieties—the Marron, the Marron Combale, the Early Marron and others—so far as I have been able to ascertain. I have not seen very many Numbo trees, but of those which I have seen, some have been diseased. Two varieties, which I have seen have not had any disease upon them. One of these I saw only once or twice and was unable to make a thorough examination. This is the Darlington chestnut which grows near West Chester, Pa. I have no reason to think this is immune in any way to the disease: all I can say is that I have not yet seen the disease on this variety. Another variety which I have heard a great deal about from the point of view of resisting the disease is the Hannum. I don't know anything about this. I have been unable to locate any trees which I could examine. Now these are all the varieties of the European or American sorts that I care to speak about, and we can say that they are all, so far as we know, with the possible exception of the one or two last mentioned, subject to the disease.

Now let me turn for a moment to two other types of chestnut. First the chinquapin, a small dwarf chestnut which grows in the southern Atlantic states but reaches as far north as New Jersey and perhaps farther for all I know. The chinquapin in the past has been regarded as a rather resistant species and my own observations seem to bear out this supposition. I have seen very few chinquapins which had the disease. It may be due partly to the fact that they are not so subject to the attacks of insects and injuries through which the blight might gain entrance, or it may be due to the resistance in the species—I cannot say about that. I had an opportunity this fall to see the Rush chinquapin. I examined these trees—there are two of them—and I think there is no question but that they are

hybrids between the chinquapin and the American chestnut. One of these trees was diseased, the other had no disease upon it.

The Japanese chestnuts have been known for a long time to be highly resistant to the inroads of this disease. Some may be immune, if we use the word immune in a very loose sense. It has been regarded as of rather coarse quality and some varieties as entirely unfit for human food. This is true of many of the Japanese chestnuts, but I have recently seen some which, so far as I could tell, were nearly as sweet as the American chestnut and Paragon chestnut which I tested at the same time and which were growing side by side. I could detect very little difference between them. The Japanese nuts were very large, considerably larger than the Paragon. Whether these will retain their sweetness in drying I cannot say. These Japanese chestnuts are seedlings, and are known as the Delaware, the Felton, the Kent and the Henlopen. Like all of the Japanese chestnuts they are highly resistant to the blight.

I wish to call your attention to a few of the standard Japanese varieties upon which I have made observations. These were all grafted trees, that is the Japanese variety was grafted on American stock. The McFarland is a rather well-known variety. Of five trees which I have had under observation, all of them became diseased below the graft but none above the graft, showing the resistance of the Japanese scion on American stock. I think this is given out as a Burbank variety. The Hale is another one which has the same record exactly. On the Coe I have seen two cases of the disease on the Japanese part and several cases where the trees are diseased below the graft. The Alpha, one of the Parry varieties holds about the same record as the Coe—two cases of disease on the Japanese part and several below the graft. The Parry Giant has been considered one of the largest nuts; in four trees observed there was one case of the disease on the Japanese part and two below the graft. The Superb had the disease below the graft but not above; the Reliance just the same way. Then along with these plots were one variety of European, the Scott, which was quite as susceptible to the disease as any other European, and another variety, the origin of which I do not know. This last appears to be something of a hybrid with some chinquapin blood in it—whether this is so or not I cannot definitely say—I can say this, however, that it takes the disease not as readily as the European but more readily than the Japanese.

Just a few words now in regard to the present distribution of the chestnut disease, or at least its extended distribution. The disease

is now known to occur in Maine, New Hampshire, Vermont, New York east of the Catskills and as far north as Lake George, and generally as far south as northern Virginia. Farther south there are some scattered infections, one nursery having been found in North Carolina which had the disease. The western distribution of the disease, if you take isolated cases, is now carried to the Pacific coast. We know of an orchard in Agassiz, British Columbia, in which the disease has been found. Nobody knows how this was transmitted, but the chestnut trees upon which the disease occurs were supposed to have been sent to the owner from the Orient. They apparently are not of the usual Japanese type, however; that is all I can say about them now.

The chestnut blight has been found on all parts of the branches, twigs, trunk and the exposed roots. Last year we found the disease on the nuts themselves and on their burs and we were able to isolate the disease from the shell of the nut and we were also able to produce the disease on the bark of a chestnut tree through inoculation from the nut itself. So that the disease can occur on almost any part of the chestnut tree.

A Member: I saw quite recently that there were two cases of fatal poisoning in Connecticut from the result of using nuts said to have been blighted. I would like to know if that has been verified.

Mr. Collins: There have been, so far as I know, about fifteen cases of supposed chestnut poisoning in the vicinity of Hartford with five deaths. We have reports of disease and possible death in other portions of the country, particularly in the northeast. These reports come in such a way that it is impossible to say definitely that chestnuts caused the trouble, but this much can be said: our office here in Washington has a physician working upon this very point. At the present time all that I can say is that there is no doubt about the cases of illness and it is impossible to dissociate the eating of chestnuts from the possibilities. At the same time it is not possible to show that chestnuts were the cause of the trouble rather than something else which was taken at the same time.

The Secretary: I wrote to the physician near Hartford whose wife is reported to have died, but I have had no answer.

Dr. Metcalf: After following those cases up and finding that chestnuts could not be excluded as a possible cause, we have started experiments with various animals, also some chemical, to determine if there is any possibility of any definite toxic substance in the nuts.

so far results are negligible. We are not prepared to say whether there is anything in chestnut poisoning or whether there is not.

THE SECRETARY: I think there are three points in relation to the chestnut blight of very great importance to the practical nut grower, and I would like Professor Collins to answer these questions. In the first place, how far are we justified in recommending planting of non-immune varieties within the blighted area, in limited quantities, with the understanding that there is a fair show of keeping them tolerably free from the blight by watchful care and cutting out? Mr. Roberts of New Jersey has a large chestnut orchard and he says he is not afraid of the blight. He has had a large crop of chestnuts this year, and he says that, while he has cut out, I believe, one orchard of small trees his large bearing trees are not seriously affected by the blight. This is the same testimony that we had from Colonel Sober last year.

The second question is, how far are we justified in recommending the planting of chestnuts outside of the present blighted area? It seems to me this is a very important point. Can we go so far outside the present blight area, perhaps beyond the present range of the chestnut tree, that we can hope to plant them without their being exposed to danger, or much danger, of contagion from the blight? Can we recommend their being planted in places where the chestnut does not grow now perhaps within several hundred miles?

And the third question is in regard to immune varieties. How far has the immune quality of any varieties been demonstrated?

PROFESSOR COLLINS: With regard to the first question,—planting of non-immune varieties within the chestnut disease area,—I don't feel like recommending it except on an experimental basis. Perhaps I am recommending something that I might feel like changing my mind about a little later, but, in the present state of our knowledge I would hesitate to recommend planting within the disease infested area. So far as the second question is concerned, the planting of non-immune varieties outside the chestnut growing area, I think there are some pretty good prospects in sight, provided the stock which is obtained is carefully inspected to see that it is free from the blight to begin with, and is watched carefully for at least the first year. The third question, in regard to immune varieties,—if there are any the immunity of which has been demonstrated sufficiently to warrant their being planted,—the Japanese, which are highly resistant, and what some people might consider immune, are the only possibilities so far in sight. The great trouble with the Japanese trees which have been grown in the orchards in parts of

the country that have come under my observation, is that they have been grafted on stock which is very susceptible to the disease, and I think it is safe to say that 80 per cent at least, possibly 90 per cent, of the trees that have been killed under these conditions have been killed by the disease girdling below the graft on the susceptible American stock. If we can grow Japanese seedlings under the same conditions, perhaps, that Colonel Sober is raising his Paragons—two years from the seed and then grafting—I don't see why we can't have a tree that is going to be reasonably resistant to the disease; now if we can find some Japanese nuts which are really palatable, really good and sweet, as these three or four that I have mentioned appear to be, I don't see why we cannot have a tree which will be reasonably immune to the disease and at the same time producing an edible nut. The Japanese stock seems to be able to fight off the disease to a certain extent in much the same way that the apple tree can fight off the apple canker, each year the lesion increases a little but each year the growth of the tree overcomes it to a certain extent, and there is a fight between the disease and the tree all the time. Very likely the disease once on the tree will remain on the tree, as far as we can tell at present, for quite a time, but perhaps not kill the tree outright.

Professor Van Deman: Dr. Van Fleet of the Department of Agriculture is working on what seems to be a very fine prospect for raising chestnuts that will be immune and that will have good quality. Japanese chestnuts are the poorest of all in quality but he has taken the chinquapin, which is of high quality but the very smallest of the whole chestnut family, quite common in many of the central and southern states and as far west as Arkansas, has crossed the Japanese chestnut and the chinquapin, and has obtained seedlings that bear very young—when they are not more than four or five feet high sometimes. They are loaded with nuts, and nuts of large size, larger than our ordinary wild chestnut, usually one in a bur just as the chinquapin is and having the high quality of the chinquapin, and he has grown many of those in New Jersey right in the very worst of the disease area and has found some that are exempt. Perhaps some of you have noticed what was published in regard to this in the *Rural New-Yorker* sometime in the past few months. I have seen the nuts from some of these trees, and while I have never eaten any, I have Dr. Van Fleet's word for it that they are of excellent quality. Now that is something that we might feel quite hopeful about.

Professor Collins: Dr. Van Fleet is doing a fine work. I have seen some of it and gone over the work with him.

Professor Van Deman: He is one of the government people and he is carrying on his experiments here at the Arlington plantation, right across the river.

Dr. Metcalf: Speaking of breeding material, we have six sorts for breeding purposes in the shape of seeds of this very species of Chinese chestnut on which the disease occurs in China. The nut of that tree is of very high quality and good size, and, so far as I can tell, quite as sweet as the American chestnut. If there is no more disease on the trees in this climate than there is in China it would be a very practical tree to grow, as far as we know.

TOP-WORKING SEEDLING PECAN TREES

W. N. Hutt, North Carolina

According to a census we have just completed there are in North Carolina upwards of 50,000 seedling pecan trees. These trees range in age from one to thirty years. Seventy-five per cent of them are of bearing age, but there is probably not one per cent of that number that are profitable bearing trees. In all parts of the pecan country experience has shown that seedling pecans are notably slow in coming into bearing and some trees never bear at all. Those that do bear have nuts that are almost invariably, small, thick-shelled and of indifferent quality. In this respect, however, the pecan tree differs in no way from any of our other classes of fruits. No one would today be so foolish as to try to get a good peach or apple orchard by planting the seeds of these fruits; but this is just what a great many people have been trying to do with pecans.

This attempt to produce pecan orchards from seed has been the origin of the 50,000 trees noted in the census above. Now that we have these seedling pecan trees, are they of any value at all? Can we make anything out of them whatever or must we cut them down and charge up the expenses to the account of experience, and start over again with standard varieties of budded and grafted trees? Years of time and quantities of money have been spent in producing these beautiful but comparatively valueless seedling trees. However, they are far from being a total loss, for in those deep roots and stalwart trunks and spreading branches, there are latent possibilities in abundance. If by some magic power like that of Aladdin's wonderful lamp told of in the "Tales of the Arabian Nights," we could transform these seedling trees in a single night to standard

varieties, we would enrich every owner of pecan trees by hundreds of dollars and the aggregate wealth of the state would be increased by millions.

For several years I have been in search of Aladdin's wonderful lamp to enlighten me how to effect this felicitous transformation. Like Aladdin's quest of old the search has been long and wearisome and has led me a tedious road through many vexatious disappointments, but at last I have found the lamp! I have in my power the magic by which a worthless seedling pecan tree can be transformed into a productive standard variety. This magic talisman is simply

Patch-Budding.

Every kind of budding is magical. Is it not wonderful to make a crab apple tree produce Stayman or Grimes Golden apples or a quince bush produce luscious Duchess pears? Is it not strange that the sap from the same root can produce red apples on one branch, yellow ones on another, and russets on a third? How does it come that one twig can be made to produce sour apples and the next Paradise Sweets? Strange! Wonderful!! but True!!! It is all owing to the fact that the sap of a tree is a homogeneous substance and that it is the bud through which it passes that stamps the individuality upon it whether it shall be a crab or a Grimes Golden. If we make all the buds of the tree of the Grimes character, the apples will all be Grimes Goldens. In the same way if we make all the buds on a pecan tree Stuarts or Schleys there will be nuts to be gathered from that tree and they will not be the worthless scrub seedlings.

When I began my experiments in the top-working of seedling pecan trees I soon found that there were many things one could *not* do with pecan trees. I counted myself a successful propagator of apples, peaches, plums, grapes and various other kinds of plants, but apple, peach and general propagation methods failed to give success in the budding and grafting of pecans. I concluded the method must be all right but that I should be more exact about my mechanical manipulations. I started out with the ordinary cleft graft commonly used for top-working most sorts of trees. I experimented in several different orchards and put in hundreds of cleft grafts. I took great pains to make my work as mechanically perfect as possible. All conditions of stock, scions, weather, etc., seemed to promise the highest degree of success. The result of that season's work was a world of disappointment, a lot of experience, and two living grafts. One of these latter, the result of my skill,

was so effectively pruned that fall by the pecan girdler that my work for the season was a minus quantity in all but experience. The other living graft, which was put in by an assistant, is now a bearing Curtis tree, our only monument to the success of cleft grafting the pecan. Other propagators are said to be able to secure fair results with cleft grafting of pecans in certain localities, but from my experience, I am willing to aver that it cannot be done in this latitude.

Next followed a series of trials with shield budding which is so uniformly successful with peach, but peach methods failed entirely with pecans. Then followed a succession of trials with whip grafting, veneer grafting, bark grafting, and chip budding, all with a varyingly large percentage of failure and a uniformly small percentage of success. Some propagators in the South report fairly successful results in the chip budding of pecans, but my results with this method were largely of a negative character.

After persistent trials of all the known methods of budding and grafting, through the varying conditions of four successive seasons, I have narrowed the propagation of the pecan in North Carolina to one single method, namely, patch-budding. This method has year after year given us the highest percentage of successful unions. The operation illustrated by figures 1 to 12, is as follows:

1. *Heading Back.*

During the dormant period which is, roughly speaking, from November 1st to March 1st, the seedling trees are cut back to stubs, the ends of which may be from one to three inches in diameter. Wounds larger than this size take years to heal and endanger the life of the tree. Large trees can be operated on as well as small seedlings, only one has to go higher up so as not to cut too large limbs. Figure 1 shows a seedling pecan tree 18 inches in diameter, which was stubbed back in the winter of 1911–1912 and successfully budded the following summer. The result of this drastic heading-back is a numerous growth of vigorous, rapidly growing shoots near the ends of the stubs, by which Nature endeavors to heal over the wounds. The cambium in these vigorous, sappy shoots is in the most active condition possible; just the condition most suitable for the union of stock and scion. This optimum condition cannot be secured except by the forced growth as the result of the heading back. Our experiments, year after year, have shown that on the ordinary new shoots, even on active young seedling trees, the per-

Fig. 1. Seedling pecan tree, 18 inches in diameter, cut back in winter, showing summer's growth of vigorous shoots ready for budding.

Fig. 2. First operation. Making parallel cuts on stock.

Fig. 3. Second operation. Making vertical cut between parallel cuts on stock.

Fig. 4. Third operation. Loosening bark on stock.

Fig. 5. Fourth operation. Making parallel cuts on bud stick.

Fig. 6. Fifth operation. Making vertical cut between parallel cuts on bud stick.

Fig. 7. Sixth operation. Taking bud from bud stick.

Fig. 8. Seventh operation. Fitting bud to stick.

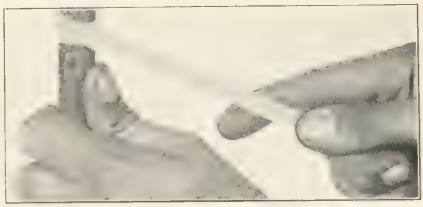


Fig. 9. Eighth operation. Beginning the tie.

Fig. 10. Ninth operation. Finishing the tie.

Fig. 11. The tie complete.

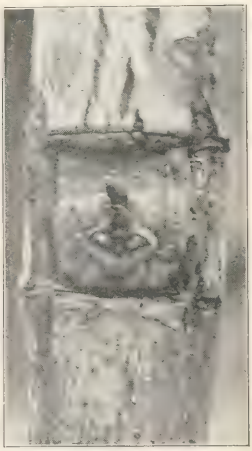


Fig. 12. Bud united.

Fig. 13. Bud stick of present season's growth. The three lower, or basal, buds are best.

Fig. 14. Bud sticks of previous season's growth.

centage of living buds was much less than on the forced shoots of the headed-back trees.

The different steps in the operation of patch budding are briefly as follows:

1st operation. Making parallel cuts on stock. See Figure 2.
2d operation. Making vertical cut to remove bark from stock. See Figure 3.
3d operation. Loosening patch on stock. See Figure 4.
4th operation. Making parallel cuts on bud stick. See Figure 5.
5th operation. Making vertical cut to remove bud patch from bud stick. See Figure 6.
6th operation. Taking bud off bud stick. See Figure 7.
7th operation. Inserting bud on stock. See Figure 8.
8th operation. Beginning the tie. See Figure 9.
9th operation. Wrapping the bud. See Figure 10.
10th operation. The completed operation. See Figure 11.
Figure 12. Bud united.

These illustrations should make the method self-explanatory.

Knives for Patch-budding.

Two sorts of knives are used for patch-budding, the double one for making the parallel cuts and the ordinary budding knife for removing the patch.

Cambium.

Professor Bailey, in his "Encyclopedia of Horticulture," says, "The ways and fashions of grafting are legion. There are as many ways as there are ways of whittling. The operator may fashion the union of stock and scion to suit himself if only he apply cambium to cambium, make a close joint and properly protect the work."

The fundamental basis of the whole science of grafting is cambium. What then is this important substance by means of which one plant may be made to live and grow and produce on the roots of another? If we strip off the bark of any actively growing, woody plant we will find just beneath a soft, colorless substance; this substance is cambium. It feels slimy to the touch and if scraped with the finger nail a little doughy mass can be raised. As we examine it it will be seen to quickly darken to cream color, then to yellow and finally to dark brown. A change has taken place in it in a few seconds, right under our eyes. When we first exposed it, it was living, active and capable of building the most complicated of plant structures; now it is dead, inert and impotent. If we examine the

smallest portion of this doughy mass under a compound microscope we will find it not merely slime but a highly organized tissue made up of countless minute cells, each with a delicate wall about it and containing a thickish liquid (protoplasm). The cambium cells are brick-shaped, and are placed end to end, with layer overlapping layer, like bricks in the wall of a building. The microscopic structure of cambium tissue gives us a clearer conception of its extreme delicacy. It is one of the most sensitive and delicate substances in all nature. Exposure to the air will kill it and completely destroy its functions in a few seconds. It is easily crushed by slight pressure and quickly killed by exposure to drying, frost, moisture and sunlight. Nature shows her extreme care of it for in making bark she has formed for the delicate cambium a perfect protective covering. Like the cambium the bark is composed of cells, as in fact are all animal and vegetable structures. But the cells of the bark have thick walls of a tough, corky substance, and each cell contains air instead of protoplasm. The corkiness of the bark makes it an impervious, waterproof covering that does not allow the cambium to be dried out or to be washed by external moisture. The air in the bark cells being in a still condition is a non-conductor of heat, and layer of bark overlapping layer, the cambium is completely covered with a dead-air blanket. This keeps it from being frozen in winter and from being overheated in summer, just as a dead-air space in the walls of a building protects from extremes of heat and cold. From this it is plain that nature takes great pains to cover and protect the delicate cambium from all external influences. This stands in striking contrast to the careless manner in which many propagators and planters handle the delicate parts of trees. It also explains why some budders get such a small percentage of living buds and some planters so few living trees.

Cambium is the building material of plants and without it growth is impossible. It covers every portion of the tree from the topmost terminal bud to the deepest root tip like a living blanket. During the growing season the cambium cells divide lengthwise forming new cells. These divide again and grow, and new cells are formed, until by fall a complete mantle of bark covers the outer surface of the cambium, while within it has built up a solid layer of the woody structure of the tree. A few rows of cambium cells are left in an embryonic condition to carry on growth the following year. The cambium is thus the only tissue of the tree that retains from year to year the power of active growth. The layers of wood and bark, after performing their functions for a few seasons, gradually die

and are overlapped by new layers, but the cambium remains living throughout the entire life of the tree even if it be, as in the giant Redwoods, thousands of years.

Besides forming the regular wood of the tree the cambium also grows out over cut places and builds in woody tissues that heal over the wounds. It is owing to this fact alone that budding and grafting are possible. The callus on cuttings and root grafts is another evidence of the same phenomenon, for the cambium of the roots of a tree is continuous and identical with that of the branches.

The Stock.

The whole practice of successful grafting and budding is the proper handling of active cambium. The cambium is the cementing material that unites stock and scion and unless there is active cambium there will be no union. It must be said here that no matter how great the future growth of the union, the scion never becomes truly united or fused with the stock. The cambium grows all over and around the cut parts and cements them together, but if the graft union be split open fifty years later, the dead wood of the original scion may be found of the original size and in the original position. Since, then, successful grafting depends on the union of the cambium of the stock with that of the scion, theoretically the best time for grafting and budding would be when the cambium is most active. Actual nursery practice shows that this is practically correct, at least as regards the stock.

The ideal stock for propagation purposes is the young seedling of one or two years growth. In such a stock all the tissues are new and fresh and working to their maximum capacity and the cambium is in its most active condition. In top-working old trees it will be found that though the branches may appear vigorous, they are a long way from having anything like the active circulation found in small seedlings. Buds put in these branches would give a very small "live," while the same care on nursery seedlings could be counted on giving a high percentage of living buds. In top-working, therefore, it is found necessary in order to get the cambium sufficiently active, to stub back the branches to mere pollards. This cutting back should be done in the winter or dormant season. The following growing season will see a dense growth of very vigorous shoots trying to repair the injury. See Figure 1. These shoots are ideal stocks for, on account of their having all the sap from the greater root of the mature tree, the cambium will be even more active than in the nursery seedling. Often when nursery seedlings

are in partially dormant condition, owing to unfavorable weather or other conditions, they may be forced into budding condition by slashing off part of the growth above where the buds are to be inserted. In our top-working experiments this fact was further emphasized by a windstorm which broke off many of the sappy shoots just above where the bud was put on. Every single one of these buds "took," though some others, just as carefully put on, failed. The success of all the buds on the wind-broken shoots was undoubtedly due to the forcing of the cambium growth just at the point where the bud was inserted.

The Scion.

Although it is desirable to have the cambium of the stock in an active growing condition, it is quite the reverse with the scion. The reason of this is evident, for if the scion were active, it would soon exhaust its small supply of food and die before the union could be formed and it could get its permanent supply of nourishment from the root. It is desirable to have scions fresh and firm but in a quiescent condition until pushed into activity by the growth of the stock. If, on the other hand, the scions or buds become too dry the sap will not be able to revive them and no union will be made.

For patch-budding, the buds may be cut from scions or bud sticks of the present or the past season's growth. Figure 13 shows a bud stick of the present season's growth from which the leaves have been cut. Such a bud stick cannot be obtained until July, for before that time the bark is so tender that it is impossible to get the bud patch off the stick without crushing it or peeling off the cuticle of the bark. The basal buds of the present season's growth, Figure 13, make the best buds because they are more mature and dormant than the buds above them and as they have shed the leaf stalk they can be tied in more easily and snugly than those with the thick, fleshy base of the leaf stalk attached. Some budders make a practice of cutting off the leaves ten days or two weeks before they commence budding and leaving the scions on the trees to ripen the buds and shed off the bases of the petioles. There is in this way no danger of the thick fleshy leaf base decaying under the wrap and souring and killing the buds.

Figure 14 shows budwood of the previous season's growth. This budwood can be cut during the winter and kept over in fresh dormant condition by being packed in damp sawdust and carried over in ordinary cold storage or in a refrigerator. It will be ready for use in the spring as soon as the bark will slip on the stocks. By

this method the budding season may be greatly extended and propagation started at least two months before any of the present season's buds will be sufficiently mature for use.

The Kinds of Buds to Select.

As to the buds themselves the most desirable are those at the base of the season's growth. See Figure 13. These, though not large, are plump and fully mature. The bark is smoother and firmer about them than higher up the stem and there is no leaf stalk to interfere with cutting them accurately and making a close fit and tie. These buds are dormant and there is little danger of their pushing into growth in the fall and being cold hurt the following winter. For best success in patch budding it is not desirable to select very large, overdeveloped buds, or those that have grown so rapidly as to stand out on a little pedicel or basal stalk. In removing such a bud from the stick, the central column of the pedicel will often pull out and remain on the stick. Such a bud will almost invariably die. An observation of pecan buds in general will show that they are normally triple in form, the largest above and two smaller ones beneath it. The largest bud will grow first but if anything happens to it, the next one will take its place.

Tying in the Buds.

A good deal of the success in patch-budding depends on the tying in of the buds. The cambium must be thoroughly protected if a union is to result. It is necessary to have some kind of tie that will retain the sap as well as exclude external moisture. After experimenting with different materials and methods I have finally abandoned all except the waxed strip tie. This is made by dipping sheet cotton in pure, liquid beeswax and pressing out all extra wax. The cloth after dipping is formed into convenient sized rolls. From these rolls the cloth is torn at budding time into strips a quarter of an inch wide and from six to eight inches long.

In tying in a bud hold it firmly so that it will not slip and begin at the top and bind it in very tightly with the waxed strip. Reverse the tie at the rear of the bud like a surgeon's bandage and cover the patch completely, leaving only the tip of the bud sticking out. The wax in the cloth will cause the tie to adhere sufficiently to the wood so that no other ligature is required. In budding in the spring, when the flow of sap is very copious, it is well to tie in a small splinter about the size of a match just below the bud to drain off the excess sap. This will save many buds from being

killed by souring of the sap. In two to three weeks time the tie should be loosened so that the rapid growth of the stock will not cause the tie to cut into the bark.

The Mechanics of Patch-budding.

After all has been said about cambium and stocks and scions and their relation to each other, there is still volumes to be written on the mechanics of pecan propagation. I do not want to scare anyone off from trying, but if there is any plant more difficult to propagate than the pecan, I have not yet found it. Even experienced propagators of general nursery stock have given up pecan budding as a bad job. On the other hand, a novice or "pecan crank" who is handy with tools and has the patience to study out the causes of his failures, may acquire the skill to obtain almost a perfect "live" of buds. This all goes to show that extreme precision is the password in the mechanics of patch-budding. In the first place, the knives should be of the finest quality so that they will hold a clean, fine edge. All cuts should be made with accuracy and precision, so that there are no rough edges and bias corners. The number of living buds will, under ordinary circumstances, be in exact proportion to the accuracy with which the bud patch fits the place made for it on the stock. The experienced pecan budder as he takes the bud off the stick can tell whether or not they will grow. If he tears the bark in cutting the patch, he drops that bud and cuts another; if the bud patch splits, he discards it; if his fingers touch the cambium or the bud patch falls to the ground, he wastes no time with it, but cuts another and another until he gets the conditions perfect. There is little use in tying in any bud that does not fit perfectly. For this reason it is desirable to have the bud stick of the same diameter as the stock. The bud patches from thin or small scions have to be stretched to fit and generally give a poor "live"; likewise, the buds from the more or less ridged portion at the top of the bud stick. The transfer of the bud patch should also be made quickly so that the cambium will have the shortest possible exposure to the air.

After Treatment.

The process of patch-budding is not complete even after a good "live" of buds is secured. It still requires some judicious after-treatment to get them into good normal growth. On account of the drastic heading back the tree has received, practically every dormant bud will be forced into active growth. These will push

out so vigorously in spring that if not held in check, they may completely overgrow and crowd out the buds put in. Attention should be given during the early growing period to see that the buds put in have sufficient room for proper development. If all or too many of the seedling buds are rubbed off, the inserted buds will not be able to carry all of the heavy flow of sap and so may be drowned and killed. On the other hand, the inserted buds may not start unless forced by the extra sap obtained by rubbing off a portion of the seedling buds. A good deal of horticultural judgment is required to adjust the proper balance between the seedling and the inserted buds so as to get the best development of the latter. When the inserted buds are able to carry all the sap of the tree, all seedling shoots should be cut out and attention directed towards forming the new growth into a strong symmetrical top.

If conditions are favorable, there will generally be some nuts the second season. By the third year the transformation from the seedling to the named variety should be complete, and a good crop of high class nuts should be expected.

Mr. Pomeroy: Would it not be an advantage if two persons worked at the budding? After the cuts are made, one could be taking the part from the stock and the other taking the bud from the budding stick.

The Chairman: That is a very good plan. One man could put in the buds and another man could tie—a boy handy with his fingers in making ties.

Professor Smith: Why the superiority of beeswax to grafting wax?

The Chairman: A good many budders object to grafting wax, on account of the oil therein contained being injurious to the trees. A great many people have dead trees as a result. Trees don't like oil, and for that reason we use beeswax and only the purest kind of beeswax. In fact, these pecan cranks who want to do things as they should be, like to examine the wax to see if there is pollen or bee bread or anything foreign in it.

Professor Smith: Is there any particular time that is best for grafting?

President Hutt: Yes; in the early part of the season there is a very vigorous flow of sap and we find we lose more buds then than in the later grafting. In early grafting we put in drainage, just like the physicians, little tubes or something to drain out the moisture. We put in a little chip and tie over it very carefully so if

there is any drainage it may escape. In the fall and late summer drainage is not necessary at all, and we really get better unions then when the trees are slowing down than we do in the spring when they are full of sap.

MR. STORRS: In selecting your buds, do you take them from trees that have borne, or from young trees, or indiscriminately?

PRESIDENT HUTT: We take them either from bearing or young trees. It is not important which, just so you get the right kind.

The important thing is to select good fresh active stuff, and particularly good sized scions and not small ones.

In budding we fit one side perfectly, and on the other side we leave a space of one sixteenth of an inch like a door. We didn't do that at first and we lost a good many buds because the active growth began on both sides. We had to leave a place there at the side, an expansion joint, to take care of that.

MR. STORRS: Then you fit them at the top and bottom and at one side?

THE CHAIRMAN: Yes, that's it.

THE SECRETARY: This is one of the most important papers ever read before this Association, and that is because the success of nut growing anywhere is absolutely conditioned on our knowledge of propagation. If the propagation of nut trees were as easy as the propagation of apple and peach trees, we would probably now have in the north as many orchards of good nut trees as of apple and peach trees. Any one who has tried this budding of nut trees will, I am sure, appreciate the difficulties that Professor Hutt has described and the pains he has taken in telling us about them. This is the beginning of the demonstrations in propagating. They will be continued tomorrow; we will have then three or four of the most expert grafters and budders in the country, perhaps, who will give further demonstrations.

I would like to ask Professor Hutt a question. I noticed that in putting in some Persian walnut buds this summer, all died except a couple where the tops accidentally broke off.

THE CHAIRMAN: That is explained by the illustration I gave of the wind blowing off all the shoots. Every one that was blown off lived even though some were badly torn. It was simply forcing the cambium at that point where it was needed. Mr. Roper had an experience of that kind.

MR. ROPER: We put buds on stock that was not very active, so the trees were cut back to six inches above the bud, forcing all the

W. N. ROPER
Vice-President Northern Nut Growers Association

growth into the bud, and I suppose 95 per cent of those buds lived; on the trees not cut back the buds did not live.

THE SECRETARY: You have spoken about soaking the scions in cold water; does not that injure the buds? We have been told heretofore that keeping the scions in water started the cells into activity and rendered them less likely to grow; but perhaps that referred particularly to scions for grafting rather than budding.

THE CHAIRMAN: I would like to ask Mr. Wiggins that question, he is a specialist.

MR. WIGGINS: One of the dangers in keeping bud wood is that of keeping it in too much moisture. It does not require much to keep the bud plump.

THE SECRETARY: I understand the reason for soaking is simply to allow the bud to be taken off.

THE CHAIRMAN: Yes.

MR. JONES: In our experience the soaking of wood does not injure it for budding, but it does for grafting. You can soak the wood for budding all you want to, we have soaked it until the top bud came out.

THE SECRETARY: I am interested in knowing about this special wax cloth. Can it be used also in grafting?

THE CHAIRMAN: The other is much cheaper for that purpose. To just cover the thing up and exclude the air is all that is necessary in grafting. Liquid wax—four of rosin, four of tallow and two of beeswax—gives excellent results, but for budding purposes it is absolutely essential to have good clean wax, and for our purposes we have never found anything but pure beeswax would answer.

THE SECRETARY: There is a substance called "white wax" which pharmacists use in making toilet preparations—purified beeswax. It is pure white. Is that any advantage?

THE CHAIRMAN: I would not use it. It contains some paraffine.

THE SECRETARY: It should consist of purified and bleached beeswax only. It is more expensive than the ordinary beeswax.

[Read by title.]

UNUSUAL METHODS OF PROPAGATING NUT TREES

DR. ROBERT T. MORRIS, NEW YORK CITY

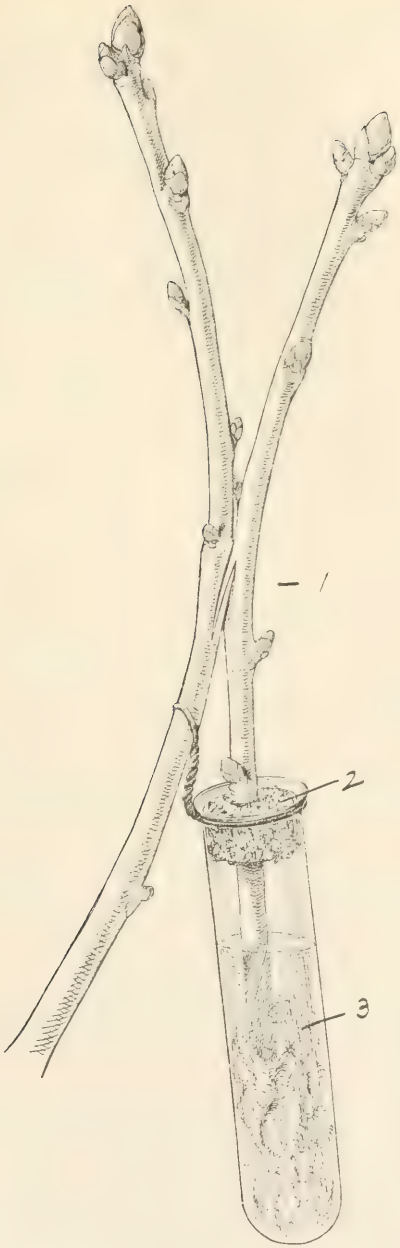
With the exception of the chestnut and the almond, much difficulty has been experienced in propagating most of the nut trees of temperate latitudes by budding or by grafting. This appears to be largely due to the slow formation of callus which is to make new cell

connection between the cambium layers of host and of guest. In southern regions of the United States the union occurs much more readily than in the north. My experiments have been made chiefly with reference to developing methods of propagating nut trees in the north. All of the usual methods common among nurserymen have been practically failures, but certain unusual methods seem to promise success.

One unusual method which was suggested at last year's meeting by our member Mr. J. F. Jones, has given a good proportion of catches. This consists in using wood which is more than one year old for scions. Some of the scions of shagbark hickory from wood four, five, and even six years of age have caught. The chief difficulty has consisted in starting the buds of this old wood (latent buds) before vigorous sprouts from the stock diverted all the sap. It has been necessary to give much attention to the removal of these vigorous stock sprouts. I seem to have made the observation that if a small side branch from old wood carries a large terminal bud, this bud will start promptly when old wood constitutes the rest of the scion.

A method which I employed for the first time this year, which appears to have resulted in securing union between stock and scion, has been employed between different species of hickory trees. It belongs among the inarching methods in classification. It seemed probable that if a scion were to be supplied with sufficient water to prevent drying out, in advance of granulation-cell connection, we might meet with success.

The first line of experimentation with this idea in mind was conducted last year. The scion when grafted upon the stock was deprived of its top bud, and a small test tube filled with water and fitted with a rubber cap was adjusted over the site previously occupied by the top bud. This in practical working really did keep the cells of the scion alive and in good condition for a long time, but there was always a tendency for the water to become impure because of the growth of various algae and other microbes. Evidently the water when used in this way helped to furnish a balance between the negative and the positive sap pressures which occur under changing conditions of barometer and temperature, and which are influential in the matter of cellular repair. The introduction of germicides into the water of the test tube prevented the development of adventitious organic life, but at the same time seemed to interfere with normal cell activity at the junction of stock and scion.



Dr. Morris's inarch method of grafting with balanced aquarium. 1. Point of union to be covered with grafting wax after binding with raffia. 2. Loose plug of moss to lessen evaporation. 3. A living water plant.

The "aquarium" is made out of an ordinary large test tube. Any small bottle would do as well.

This method served a purpose in advancing our knowledge of the subject, but not enough grafts caught to encourage me greatly. Following out the same line of thought, I began this year by making union between stock and scion according to inarch principles. The scion instead of remaining attached to its parent plant, according to former inarching method, had been transferred to the stock, leaving two or three inches of scion free below the point of grafting, as illustrated in the drawing. The proximal part of the scion was then inserted into a test tube containing water. In this case, as with placing the test tube at the top of the scion, difficulty was found in preventing the growth of microörganisms in the water. The addition of benzoate of soda, borax, boracic acid, and sulphate of copper, while preventing the development of microörganisms, seemed also to be objectionable to the physiologic processes of the plant. It occurred to me that the principle of the balanced aquarium might be applied, and acting upon this idea specimens of a pond weed (Utricularia) were introduced into the test tubes. This seemed to settle the water question completely, but it was well along in the summer before I made grafts and applied this principle. From one to four leaves, or parts of leaves, were left upon grafts which were applied to stocks according to this new inarching method. All of these leaves remained green until autumn, and fell with other autumn leaves of the stock. Two specimens which I have cut away for examination seemed to show a very good union between stock and scion.

I am presenting a description of the new inarching method promptly, before obtaining more extensive statistics, in order that members of this society may apply it experimentally next spring. Should it succeed according to present promise, it will allow nurserymen at least two months of grafting season, and they will not have to rush their work. In addition it will perhaps open up a method of grafting which may be employed freely with nut trees in the northern states.

Another unusual method for propagating nut trees consists in facilitating the development of adventitious buds from the roots of some particularly desirable tree. I do not know at the present time how many species of nut trees will develop adventitious root buds, as my experiments have been confined to roots of the shagbark hickory, beech, and hazel. Segments of roots of these three species when placed in sand, allowing an inch or so to protrude, will develop adventitious buds if they are kept warm and moist. Various lengths of root segments have been employed, ranging from two

or three inches up to two or three feet. The beech and hazel will apparently start adventitious buds from almost any sort of root segment; but in the shagbark hickory, adventitious buds started best upon root segments which were more than six inches in length and more than half an inch in diameter.

Hazels may be propagated in an unusual way from the cuttings of branches, very much like roses, if these cuttings are placed in sand and kept warm and moist, although they do not strike nearly so readily as rose cuttings. I have not given much attention to this experiment in its practical bearing, but have simply observed that hazel cuttings will strike roots if they are particularly well cared for.

Experiments with hickories and with walnuts from branch cuttings were a failure, but they remained alive so well and formed such good callus, that I believe someone with steam-heated hot-house beds at his disposal may by experimentation succeed in propagating some of these trees by cuttings, particularly from herbaceous growth of the year, in August. As an amateur plant physiologist I foresee what the more scientific plant physiologists may do for this subject.

One unusual method for propagating nut trees may perhaps be described more correctly as a method for propagating unusual nut trees, and it opens a vista of distant horizon in horticulture. The discovery was due to an accident, and I claim no credit beyond recognizing the significance of an odd phenomenon.

Three years ago some pistillate chinkapin flowers which had been covered with paper bags, were left unpollenized because I did not have pollen enough to go round. The bags were left in place because I was busy with other things. When these bags were removed at the end of about three weeks, it was found that the flowers had set a full complement of nuts without having received pollen. These nuts continued to develop and were fertile. Some of them presented a peculiarity in growth of the cotyledons and germ, both of which grew and protruded beyond the involucre before the nuts were ripe, indicating that the germ had not come to a state of rest during its usual period in the nut. This freak appeared in only eight of the nuts, a larger number having normally resting germs.

In all of these nuts it seemed to me we were probably dealing with parthenogenesis. In order to make sure that no pollen had been carried in by any sort of insect, I made check experiments last year, covering pistillate flowers so carefully that there could be no question about their having received no pollen. It was found that the chinkapin would develop nuts freely in this way, and that the

bitternut hickory, shagbark hickory, and pignut (Hicoria glabra) would develop nuts sparingly in this way.

I speak of the matter as parthenogenesis in advance of microscopic examination of the ovules,—which will be made next year; but parthenogenesis seems to be the most likely explanation. If this is the case, the embryo has not been formed by the conjugation of two gametes, as generally occurs in the algae and higher plants. It is possible that the embryo in the unpollenized chinkapins does not originate from the female gamete at all, but that it originates from a formative budding of other cells in the ovule. We can speak of parthenogenesis only when the embryo originates from a female gamete alone, *i. e.*, without fusing of protoplasmic mass of the female gamete with protoplasmic mass of the male gamete.

Some of the nuts which I am calling parthenogens have developed plants this year. The chief peculiarity to be observed is great disparity in size between plants of the same age from the same parent tree. Some of them grow very much more rapidly than the average plant of the species, and others less rapidly when subjected to similar conditions of soil, temperature and moisture.

We assume in biology that one of nature's objects in having two sexes is to prevent early senescence of the allotment of protoplasm for a species, and to avoid undue intensification of characteristics of one parent. This is apparently nature's device for maintaining a mean type. For man's purposes we may now make artificial selection of individual plants which represent intensification of desirable characteristics of one parent. The growing of trees from unfertilized ovules will apparently open an entirely new field in horticulture, and no one can prophesy the result of selection of trees which present intensification of desirable characteristics of a single parent through several successive generations.

THE POSSIBILITIES OF NUT CULTURE IN UTAH

Leon D. Batchelor, Utah

I suppose the majority of you have very little or no idea of agricultural conditions in Utah. Perhaps some think it is a desert. When I went to Utah, three or four years ago, the first thing that struck my mind forcibly in traveling around through the state was the absolute lack of any nuts. Being born and brought up in Massachusetts, I naturally noticed this, as one of the pleasures of my boyhood days consisted in gathering chestnuts, hickory nuts, hazel-

nuts and beechnuts. We found them all around the fence corners and pastures and in the woods, and I missed this in Utah, and it occurred to me immediately to look up the cause of the lack of nuts in the state and I found no good reason except that nature has not seen fit to plant nuts there. There is no reason in climatic or soil conditions which will make it impossible to grow many of the hardier nuts, and even, in the southern part of the state, to grow almonds and the tenderest walnuts. Climatic conditions are not unlike some of the best fruit sections in New York. Peaches and apples are grown successfully and as soon as you get down to the central and southern part of the state, many of the hardier European grapes are grown. In the extreme southern part you can grow any of the European grapes grown in California, so nothing in the way of climatic conditions exists which would prevent the development of nut growing in this state. The soil conditions vary widely, all the way from the sandy loams to the deep soils and gravels, and it is possible to find thousands of acres of deep, rich loam soil. Some of it is five to twenty-five feet deep. Of course the rainfall in that semi-arid region is insufficient for nuts but that can be supplemented by irrigation water, so that is practically no disadvantage. Since I have been there I have tried to interest some of the fruit growers in the planting of a few different varieties of the hardier nuts, and I have distributed among them some of the walnuts and this year I am bringing in some of the old shagbark hickory nuts from Massachusetts, and I am going to distribute them among my friends and acquaintances there to be used to raise shade trees—trees around the home and pastures—and I find there is considerable interest manifested in the last few years in nut planting. The nut industry has a little mite of a start there in a way—that is, there are a few seedling trees distributed from Logan on the north to Arizona on the south. Seedling Persian walnuts fruit from Brigham City on through Salt Lake and Provo, and practically all of the nuts that are produced there in the state are of seedling origin. It is reasonable to expect that some of the best grafted varieties will be very much better. It seems to me that the state has every natural condition for success in the production of nuts. If not in a commercial way we can do a great deal to our advantage in planting nut trees as shade trees. I simply want to let you know that there is a man out there in the mountain section who is interested in nuts and going to help the cause along.

THE DISEASES OF NUT TREES

M. B. Waite, Washington, D. C.

In taking up the question of nut diseases it is hardly proper, perhaps, to take too narrow a view of it and I will, therefore, mention some of the other work being done here in Washington that is of interest to the Northern Nut Growers Association.

You all know of the pomological work being done on nuts, and I hardly need mention the work now being carried on by Mr. C. A. Reed, a member of this association. It might be well to remind you that the work was started by Mr. Van Deman some twenty-five years ago, and continued by Mr. Corsa, and a report was issued some fifteen years ago. It was taken up later by Mr. William A. Taylor.

The plant introduction work of Mr. D. G. Fairchild should be mentioned. He is scouring the world for new nuts of all kinds for the northern and southern, eastern and western United States, and introducing them into this country. The diseases of those nuts are studied by Mr. Orton in the Cotton Truck Division of our department.

Outside of the Bureau of Plant Industry also there is some work being done on nut trees. The insects attacking cultivated nuts are studied by Professor A. L. Quaintance, of the Bureau of Entomology, along with the deciduous fruit insects. The insects attacking forest nut trees are studied by Dr. Hopkins of the same Bureau in the laboratory that studies the forest insects. Of course the nut trees, as forest trees, are studied in the Forest Service about which you all know.

One thing more that I would like to say, in way of explanation or apology, is in regard to criticism of the Department for not more thoroughly attacking the filbert blight. Only forty-five thousand dollars are appropriated by Congress for the investigation of the entire fruit disease problem of the United States. That includes the great citrus industry; everything, in fact, from cranberries on Cape Cod and the mouth of the Columbia River to grape fruit in Florida or apples in New York. It includes the subject of all the nut diseases, and that means the problem of the diseases of the pecan, of walnut bacteriosis—that is a big problem—in southern California, and more or less in other parts of California, our great apple industry, the peach yellows, the pear blight, etc. When it comes to parceling that out it only leaves about three thousand dollars for nut diseases, and thirty-five hundred dollars for studying

diseases of citrus fruits, so you must not be surprised that we cannot put a group of men on this problem and study it as it should be studied. It is a question of men and means.

Perhaps now some general information might be of interest and set you to thinking.

In the first place in every disease problem, conspicuously so with our fruit and nut diseases, there are two main classes of plants to be considered, our native plants and the foreign plants. The pathologist is always looking to the native origin of a plant in studying its adaptation to the environment in which it is attempted to be grown. A foreign plant may not necessarily be unadapted to another locality. The vinifera grape is thoroughly adapted to California and to much of the Pacific slope beyond the Rocky Mountains, but you know the vinifera grape has a hard struggle in other parts of the United States. This is not only a pathological problem but a physiological one. It cannot stand a soaking rain for two weeks at a time; it cannot stand so much water and humidity but it wants dry, hot sunshine continuously from the time it puts out its leaves in the spring.

Another phase still more interesting is the question of foreign parasites. Many of the worst diseases with which we have to contend are either native diseases attacking introduced plants, or foreign diseases attacking native plants. I will take that up in detail. Nature has fought the battle all out with the native parasites against the native host plants, so we don't have to do it. It's a case of the survival of the fittest. They have won, so when we are dealing with native plants against our native diseases, we have a condition that has been fought out in nature for nobody knows how many thousand years. The result is that unless we disturb the balance too much by cultivating great orchards of a thing that has been grown as scattered individuals, or overforcing it or selecting and breeding towards larger fruit without any regard to foliage and other characters we can go ahead with our breeding and selection and cultivation and trust nature to keep the balance to some extent. We have this natural balance in our favor in dealing with the problem of cultivating native plants. As an example take the pear and apple blight. The pear blight problem is one in which a native parasite on wild crab apples, which occasionally kills a few twigs here and there, attacks the juicy, tender, susceptible, introduced European pear and makes a very serious disease. It is a fight indeed to grow it in so much of the country that pear culture has been very largely suppressed over the eastern half of the United

States and part of the Pacific coast. All this trouble has been caused by one little native microbe. Apple culture also, with certain varieties, has been seriously interfered with in some sections.

The apple cedar rust is probably the most striking example of a native parasite attacking a foreign host that we know of, and particularly so as the remarkable evolution in which the parasite has adjusted itself to the new host is taking place right now every year. The apple cedar rust is becoming a more difficult problem clear across the eastern United States to Nebraska. It has occurred as a serious disease since 1905 to 1907. As a botanical curiosity we have known it a long time, but as a serious disease, it is very recent, and nobody knows yet how serious it is going to be.

We have a very striking example of this introduction of a foreign plant and the plant being attacked by a native parasite, in the case of the filbert blight, and I am going to take that up later. The trouble is that we have brought into the United States a European filbert and it has been attacked by a parasite of our wild hazelnuts. The disease is very rare and is seldom seen on the wild hazelnut, —so rare that it was hardly known by scientific botanists, and yet it interferes with filbert culture in the eastern United States and is the one thing more than anything else to make filbert culture unprofitable. We have practically the same proposition in the walnut bacteriosis, not only in the northeastern United States, but in the best walnut districts of California. This bacterial disease which is undoubtedly a disease of our native walnuts—probably the native black walnut—occurs rather rarely, and so feebly developed as to be difficult to find at all on its native host yet it becomes the great serious disease of the Old World cultivated walnut.

Now, there again, it is not so much a lack of physiological adaptability, because the walnut is thoroughly adapted to our Pacific coast. I suppose most of you know that east of the Rocky Mountains, east of the Great Plains, we have a humid climate and winters more or less cold which corresponds, not with western Europe, not with Germany, England, Spain, France and Italy, but with China and Japan, with Asia, in its climatic conditions. The result is the Chinese and Japanese trees brought to the eastern United States grow well but may grow indifferently in California. On the other hand, the plants of the Mediterranean, France, Germany, Italy and Spain do not, as a rule, thrive when introduced into the eastern United States. There are a few exceptions, like the apple and perhaps the peach. These are not really natives of western Europe, but have been brought from the interior. They are more like the

Japanese and Chinese plants which came in by way of Persia and which have been slowly adjusted to the conditions of western Europe. That adjustment has gone so far that the Persian type of peach does better on the Pacific coast than in the East. We are breeding a race of these fruits from China, the Chinese cling group, which does well in the eastern part of the United States, and we have from there a peach that is better for the country east of the Rocky Mountains than the ones that have been modified in Europe.

Now take the other side of this question, the foreign parasite—that is very unfortunate thing—over which we do not always have the control that we do with the foreign host. An equal disturbance of nature takes place when we introduce a foreign parasite, whether it is from a similar climatic region or one not so similar. The chestnut blight is a tremendous example of that sort of thing. This has come into prominence within a decade and it is one of the greatest problems in the pathology of the chestnut. That has turned out to be a Chinese parasite. It was found last summer by the agricultural explorer, Mr. Myers, but the fungus was studied out by Dr. Shear.

The three great American parasites of our native grapes are the black rot, the downy mildew and the Phylloxera, an insect pest, and they caused a great amount of study and work and investigation and great expense when they were introduced into France and South Germany and Italian vineyards, and were fought out only by what might be considered a magnificent effort on the part of the European governments, especially France. On our native wild grapes those diseases are almost trivial, and the wild seedlings in the woods are practically immune, but when we cultivate them and select the tenderer varieties, the black rot is pretty bad, especially on the Concord, and particularly when that is hybridized with grapes of European blood. Nevertheless, we have cultivated them in order to get the large juicy fruits. There are many more examples of this sort.

Now about the cultivated nuts. I wish I could tell you how much I think of the native nuts. I grew up in Northern Illinois and could go out on a day like this and gather two or three bushels of hickory nuts. How I enjoyed the black walnut, especially when it was just shriveled so it would leave the shell—it got rather too rich when it was dried and stale in the winter time—but how delicious it was when just wilted! Also there was the butternut and the wild hazelnut. I used to take a one-horse wagon into the woods on a Saturday and gather enough hazelnuts in the shucks to fill it; then we had hazelnuts all winter. So I am in full sympathy with the

Northern Nut Growers Association and I would like to see those nuts grown, if not wild in the woods, at least in cultivation.

There might be a few things of interest to you about the wild hickory nut. According to Farlow's Index of North American fungi of twenty-five years ago, there have been thirty-seven species of fungi collected on that tree. Probably there are twice that number as a matter of fact, but mycologists have collected, described and named thirty-seven species on the *Hickoria ovata,* the plain shagbark, and the other hickories have similar numbers. The pecan has only three named species in Farlow's Index, but Mr. Rand has got together three times as many I think—I am not sure of the number.

Of the pecan diseases, the pecan scab is probably the most conspicuous fungus trouble. The pecan scab is the most typical fungus parasite of the pecan. It attacks the leaves, fruit, etc. It attacks the vessels or veins of the leaves and frequently enters by means of aphis punctures which break the skin so that there is no doubt but that this particular disease is favored by an aphis. We have investigated this disease quite carefully and carried on a series of spraying experiments for some three years and there is no doubt about our ability to control it. It can be prevented by spraying with Bordeaux mixture. You never can tell how many sprayings will be required. It may take three to ten sprayings to protect the nuts. The leaves are grown mostly within a month—the leaves are pushed out within thirty days and you can spray those leaves and protect them. The weak point in the treatment is that the nut of the pecan grows steadily from the time it starts to way into September. This makes a hard problem in spraying as the nut keeps expanding and forming a new and unprotected surface for an unreasonably long season and they are susceptible to scab attacks all the time, so you have the problem of spraying the nuts all summer. The spray does not stick very well on the nuts. The result is that we advise dodging that parasite by planting the non-susceptible kinds; it is much better and cheaper. It is certainly an encouraging thing that you can plant good varieties, that do not scab badly, and which at the very most require but two or three sprayings to protect them entirely, and in a great majority of cases, no spraying at all. Those already are the great nuts in cultivation, like the Stuart, the Schley and the Frotscher. Most of those good varieties will be occasionally attacked by scab because of a wet season, just as a variety of apple which is very resistant to apple scab is occasionally attacked by that disease.

The pecan has quite a number of leaf-spot fungi and most of those we have tested by spraying. These experiments have been

made in the nursery where it is more convenient to spray and where the necessity is, perhaps, a little more pronounced, and there it is, undoubtedly, a proper practice to spray and fight out the pecan leaf diseases. Bordeaux mixture is the thing to be used on all occasions. The pecan resists copper poisoning almost as well as the grape and can be sprayed with safety.

If a pecan tree has crown gall don't plant it. All nursery trees should be rejected in planting if they show signs of this disease. The pecan has fungus root-rot and various wood rot fungi besides the leaf diseases. It also has several other troubles more or less serious. Occasionally in the pecan groves you will find these remarkably white mildewed nuts. That gives way to spraying. Another disease is an internal spot on the kernel which Mr. Rand has been working on and which seems to be due to a fungus. We don't know how to prevent that yet. The pecan has a fungus attacking it that is very similar to the bitter rot of the apple. The pecan anthracnose looks like the bitter rot, has the same pink spore masses and you will be able to recognize it. That may be prevented by spraying, but it is, fortunately, not a serious disease. The northern nut grower will not have so much trouble with that, as it is a southern disease. Here is a physiological trouble that causes blackening of the young nuts on the inside. It appears to me to be due mainly to wet weather, but I don't know its exact nature. It came primarily on a pecan raised in the semi-arid section of Texas and brought into South Carolina, and by the way you can get as much trouble in adapting trees from the western to the eastern United States as in bringing in trees from other countries. In parts of semi-arid Texas the trees are supplied with moisture by sub-irrigation and when we move those pecans to the humid East we get almost as much non-adjustment as when we bring in foreign things. I would suggest that these pecans from western Texas are the very ones to take to Utah and California rather than those from the eastern part of the United States. They are adjusted to dry seasons with moisture at their roots and you will get the best results from them when grown under irrigation.

I will now take up the walnut, *Juglans nigra,* the common black walnut. There are twenty species of fungi which are known to attack it. Quite a good many of these attack the twigs and cause them to die, and probably half are leaf diseases. One, commonly called white rust, a disease of the leaves, attracts mycologists in collecting, but it has never been of serious economic importance.

Now, as to the butternut, *Juglans cinerea.* It has about nineteen

species of fungi known to attack it, but probably many more will be found when the nut is thoroughly studied.

Juglans regia, the cultivated Persian walnut, has only about twelve species of fungi recorded from it in this country. There are, undoubtedly, more to be found. Of these fungi the walnut bacteriosis, caused by a bacterial germ is more important than all the rest of the parasites put together we can easily say. The California walnut bacteriosis has turned up at various points in the East. The twig blight form of this disease is also prevalent in various states. The walnut blight or bacteriosis is therefore to be figured with in planting the Persian walnut in the East.

PROFESSOR SMITH: Is it worse or better here than in California?

PROFESSOR WAITE: There have not been enough walnuts grown here in groves to allow the disease to accumulate—to have a fair test for that, Professor Smith. I don't believe we know; but it is, undoubtedly, a parasite of our native black walnuts. It occurs in Texas and Louisiana, and I think we have it in or near Buffalo, N. Y., and in New Jersey, so if I were planting extensively I should expect that disease to be serious. That would be my forecast of the matter. The humidity and the cloudy weather in the East ought to be more favorable to the disease than the climate of California.

MR. JONES: For that reason I should think the disease would work fast in the Gulf Coast.

PROFESSOR WAITE: Yes, those specimens of yours seem to show a very serious condition.

We must not pass over the chestnut without noting that there are thirty species of fungi attacking it, and that does not include the new one, the bad one, the chestnut bark disease.

The filbert blight belongs with the diseases of the European grape and sweet cherry. The filbert is an example of a European plant introduced into the eastern United States attacked by a native parasite which almost drives it out of cultivation. In fact, there are so few filberts in cultivation even now that if we were trying to plan a spraying experiment on them we would not know where to find a plantation suitable for carrying on the experiment. If any of you know of any such plantations I would like you to let me know about them.

THE CHAIRMAN: We will have some in two or three years.

PROFESSOR WAITE: Here is a sample of the filbert fungus taken from our pathological collection. It shows the mature fruiting bodies of the fungus and it also shows that the twigs are killed.

This fungus is known as *Cryptosporella anomala*. It was described as *Diatrype anomala* by Peck of Albany, N. Y., but was afterwards found to belong to another genus. There have been two or three articles published on it, the best one probably by Humphrey in Massachusetts. I have an abstract of that which can be copied in the proceedings, if you wish.

(See Appendix.)

The fact that this *Cryptosporella* is related to the black knot of the plum is an interesting feature; and that it attacks the growing canes during the growing season and fruit during the fall and winter. He suggests the treatment of removing all the infected branches during the fall and winter. I would add to that, complete eradication of all diseased branches of the host, and they are rather easily seen, in the fall as soon as the leaves are off—then a thorough spraying with strong Bordeaux mixture, at least 5–5–50, preferably stronger than that, of course burning all the material that you cut out. One is at a disadvantage if there are wild hazelnuts in the neighborhood. How to handle that problem I am hardly prepared to state; perhaps, by eradication of the wild hazelnut in the vicinity.

The Secretary: I think that would be impossible in most regions.

Professor Waite: Mr. Kerr had his growing on the eastern shore on an island where there are no wild hazelnuts and they were not attacked by the fungus.

A Member: They are all dead now.

Professor Waite: The number of sprayings during a season is an undetermined question. It will be necessary, probably, to spray two or three times. You can certainly protect the two-year wood in that way by making a fall spraying and a spring spraying. This will keep them thoroughly covered with Bordeaux mixture but whether or not three or four sprayings are necessary remains to be tested.

The Chairman: Are any varieties of European hazels immune?

Professor Waite: I have not studied them enough to answer that question. I don't know. They all seem to go down. Perhaps Dr. Deming can answer.

The Secretary: I don't know.

Professor Waite: I think that is all I want to say, except one thing, and that is about the physiological aspect of these diseases. I touched upon that phase in discussing the matter of environment in the introduction of foreigners to places where they are not adapted. In some particular seasons and circumstances even the native trees

suffer. One type of injury which has caused great trouble with the English walnuts and pecans, and also with apple trees and has also caused trouble with our native red oaks, is freezing when the trees are in a non-resistant condition. There is an example of this within three minutes' walk of this building. Here are the climatic and temperature conditions that bring about disaster, particularly if preceded by a dry season. Let us start with a dry season. The season of 1911 was conspicuously dry in this locality and the adjacent states of Virginia, West Virginia and Maryland, but about the first of September the rains came. Up to that time even the native forest trees such as oaks and chestnuts showed the stress of lack of moisture very seriously and were somewhat yellow and pale looking, mainly from water and nitrogen starvation. When the rains came the wilted trees all greened up, every tree in the parks brightened up, and we had fine growing conditions until October and no cold weather up to New Year's. It was warm that fall and even on New Year's day the warmth was noticeable. On the 12th of January we had the record cold temperature for this locality in the history of the weather bureau, except one year. We had fifteen or seventeen below zero and it was as low as thirty-eight in low spots in the Potomac Valley in West Virginia. Those trees had never been fully shocked into winter conditions. The cambium growth and sap flow had not been stopped and the physiological changes needed to get the trees ready for cold weather had never occurred. They were not ready, not only as to the bark, but in the trunk and wood. The result was that the trees were seriously injured, the less matured twigs died back, and the trees were frozen on the trunks down to the ground line. In the freeze of 1904 in New York I was surprised to find that the peach trees were not all killed. They were frozen through and through and yet the trees did not die. The question of winter injury hinges not alone on low temperature, but it also depends on the condition which the tree has reached when the cold strikes it. Now, to tell you still further about what that cold wave did, I will ask you to look at that row of red oaks near the Smithsonian which I just alluded to and see the big ribs of dead bark where the cambium layer has been shocked, and checked in other places. You will find these trees ribbed and ridged to about half way down the row. Those trees are subject to special disadvantages; they lack subsoil drainage and they have an excess of manure draining down through the paving stones. They have an excess of nitrogen and lack of drainage. The subsoil is a heavy clay. That brings up another thing that I want you to notice in regard to

winter injury. Plant not only hardy varieties, but select localities with good subsoil drainage. The walnuts and hickories, belonging to the two great families of juglans, and the oaks and chestnuts, want good subsoil drainage. Where the underlying rocks are vertical the conditions are ideal. They do not like a heavy clay subsoil, but do best where water and excess nitrogen can get away.

The general summary I want to make is this: Nut trees have a large number of fungus parasites. In a few cases the native fungus parasites attack European or Old World species and varieties to such an extent as to make very serious problems, so much so that they can not be regarded as solved, the walnut bacteriorosis and filbert blight being examples of these. On the other hand, most of the native fungus parasites of our native trees are not to be feared as enemies of these trees, not only in the northeastern United States where this body is endeavoring to further a good cause, but over the whole eastern United States. These parasites in some cases may be serious enough to justify spraying and other lines of treatment, especially in the nursery. On the other hand, considering the nature of nut trees and considering the results of work on the pecan scab, the object of the nut grower should be to breed and select as far as possible resistant sorts, to work on and select native species and hybrids particularly where the native trees will give the necessary hardiness, immunity and resistance. The outlook, therefore, is promising for the cultivated varieties of hickory nuts and walnuts that I know you are all working for. Foreign parasites are always dangerous. This chestnut blight fungus comes into any such scheme as that like a bombshell. When it comes to an introduced parasite like that we can not tell what will happen. I thank you for your attention.

The Chairman: I think everybody here will agree with me, when you come to look over this list of amounts appropriated for work in nut culture investigation, that there will be no further criticism of the Department of Agriculture from any member of the association for not doing more in the interests of the nut grower.

The Secretary: We are all indebted to Professor Waite for his clear way of stating facts, for resisting the temptation to give a technical talk and for enunciating principles of wide applicability.

This question of the blight on the hazel is a most important one for the northern nut growers. Mr. Reed was telling me yesterday about a man from California who went out near some city there and bought 10 acres of land at six hundred dollars an acre, planted

almonds and in a few years had the place paid for and was making a good income, two or three thousand dollars a year from his ten acres of almonds. We can do almost that in the East, I believe, if we can cultivate the European hazel. If it were not for this blight, we could have splendid crops of the hazel. If the government would grant larger appropriations for nut culture investigations it might enable us to find a way to control this disease. Dr. Morris is breeding hazels, however, and hopes to get one which will be immune.

PROFESSOR SMITH: It is a great pleasure to listen to a man who knows what he is talking about. I figured out some years ago that I was going to be a teacher and I decided that I would like to have a chestnut farm also. I got along very nicely, planted my trees and then the chestnut blight came along, and I regard the business, at least as to profits, as in abeyance. We are in a period of particular danger from the importation of foreign plants; we are bringing in perfectly innocent-looking things from other countries which are causing us great damage. I want to suggest to any one here who wants to plant an orchard, to plant two kinds of trees. If my nut orchard had been planted with something besides chestnuts, I would now have that something else. I would suggest the possibility of having two things on the same ground—say chestnuts and English walnuts—so if the planter finds he cannot raise one he can still have the other. Then he will not be in the same place I am with my chestnuts.

THE CHAIRMAN: I understand we have Mr. Fullerton of Long Island here, and we would be pleased to have him give us some of his experiences.

MR. FULLERTON: I just came in to see what you folks are doing and I don't think I can pose as a nut expert. I live on an island that has a great many varieties of nuts on it that have become native. We have quite a plantation of hazelnuts; nobody knows who planted them. They are used by nurserymen to fill orders. Also quite a plantation of magnolias which came from the South a couple of hundred years ago. They are thoroughly acclimated. We have also some of the very largest—and I am going to catch it here because I have never used a tape line—we have some of the very largest and oldest of the Persian walnuts in the United States, which produce annually a big crop of the so-called "English" walnuts. The trees produce the largest walnut I have ever seen, with the thinnest shell. They have been there about one hundred and fifty, two hundred and fifty or three hundred years. They

DR. WILLIAM CHAMPION DEMING

Secretary-Treasurer of the Northern Nut Growers Association

are very large, larger than the black walnuts. Whether they were planted or not I don't know. Their history is probably this: Long Island was a sea-faring community a few hundred years ago. These sailors who went out from the island, some of them, loved nuts and they would bring back from other countries nuts or other plants, and now we have a most remarkable mess of trees. We have planted the Japanese walnut, I don't pretend to know which variety, and it began yielding the third year and has yielded every year since, bearing nuts in bunches like grapes.

THE CHAIRMAN: Is it a heart-shaped nut?

MR. FULLERTON: Yes. We have some pecans and some almonds. Against the advice of everybody we planted some almond trees; they started to bear in their third year. The trees are one solid mass of glorious big red blossoms every spring. They bear very heavily and have for three distinct seasons. Hard winter or easy winter, nothing has affected their bloom and they have never had a particle of San José scale until this year. The almond grows all over the island. Also the pecan. I planted five varieties of pecans and they are still living and growing very slowly. They have been moved three or four times. Last year we planted seven varieties including the Van Deman and the Stuart and one Indiana variety. One of these trees died and the others were killed back, but they have sent up big shoots.

Two years ago an old fellow came up from the middle of the island to see if our pecan trees were the same kind as his. His story was very remarkable. He didn't know anything about trees. He went into town one day and got interested in pecans and bought all the different kinds he could find, all the different shapes. He didn't care what they were—didn't care whether they came from Canada or Mexico—he was the kind of a man who would plant bananas,—and he planted all those pecans and he told me that every one of them grew. He said they all produced nuts.

MR. POMEROY: The first Persian walnut nursery ever established in the United States was at Flushing, Long Island.

THE SECRETARY: I should like to ask how old and how big are the pecan trees that are bearing?

MR. FULLERTON: I think he said seven or eight years.

THE CHAIRMAN: The insect question is one of great interest. Professor Quaintance can give us a good insight into the insects that attack pecan and other nut trees.

INSECTS INJURIOUS TO NUT TREES

A. L. Quaintance, Washington, D. C.

I have not very much to say because we have not yet accumulated much information on the subject of nut insects. I am glad to appear before you, however, and to assure you that attention is being given to the insect enemies of nuts by the Department. We are not nearly so far advanced in the subject, however, as Professor Waite, since our specific study of nut insects began only, this last spring. At that time we established a laboratory in the South, especially to study pecan insects, as the demand for information concerning these pests has been very strong. The Bureau of Entomology, however, for a number of years, has published more or less on nut insects, as opportunity offered, and I think I should call your attention to a few of the papers treating of nut insects, and which I recommend that you obtain, if possible:

The Nut Feeding Habits of the Codling Moth, Bulletin 80, Part 5, Bureau of Entomology.

The Fall Webworm, Farmers' Bulletin 99, U. S. Department of Agriculture.

The White-Marked Tussock Moth, Farmers' Bulletin 99, U. S. Department of Agriculture.

The Bag Worm, Circular 97, Bureau of Entomology.

The Apple-Tree Tent Caterpillar, Circular 98, Bureau of Entomology.

Nut Weevils, Circular 99, Bureau of Entomology.

The Red Spider, Circular 104, Bureau of Entomology.

The Leopard Moth, Circular 109, Bureau of Entomology.

The Walnut Borer, Fifth Report, U. S. Entomological Commission, page 329.

The Oak Pruner, Circular 130, Bureau of Entomology.

Insects Injurious to Pecans, Bulletin 86, Mississippi Agricultural Experiment Station.

Insects of the Pecan, Bulletin 79, Florida Agricultural Experiment Station.

The Walnut Weevil or Curculio, Twelfth Report, State Entomologist of Connecticut, page 240.

The Walnut Bud-Moth, Twelfth Report, State Entomologist of Connecticut, page 253.

The above list will furnish information on most of the important nut insects thus far known. Inasmuch, however, as the walnut,

pecan, etc., are native trees, it is probable that when these nuts are cultivated they will be attacked by many of the insects which prey upon them in nature. This we have found to be true to a considerable extent in the case of the pecan. Many of the pests of hickory, for instance, are becoming important enemies of the pecan.

We have few requests for information as to the insect enemies of the hazelnut or filbert, practically none as to the almond. I surmise that there is comparatively little injury to the two former crops in the United States, and that in the case of the almond it is largely free from insect pests. The secretary has suggested that I make reference particularly to the insect enemies of the walnut. We have had complaints of severe injury to walnuts in California from the codling moth and walnut aphids. In this state and in the arid sections where walnuts are commercially grown, the codling moth, the well-known apple pest, has turned its attention to the walnut, and under some conditions does serious injury. If walnuts are growing adjacent to pears, the marketing of the crop, which occurs about the time the second brood of larvæ is at its height, deprives these insects of further food and they turn their attention to the walnut. The walnut plant lice in California have just been investigated by an agent of the Bureau of Entomology and we now have a paper in press on these insects. We think it propable that spraying will be a satisfactory remedy where the trees are not too large.

In the East injury is confined largely to certain caterpillars infesting the foliage, as the white-marked tussock moth, the fall webworm, a species of *Datana,* and occasionally reports of severe injury from red spider are received. Rather recently a good deal of interest has been aroused in the so-called walnut curculio by reason of its attacking the shoots and leaf petioles of the Japanese walnut. It attacks also other species of walnut, including the English walnut and the butternut. This pest has been well treated by Doctor Britton in his report as State Entomologist of Connecticut for 1912.

While pecans are perhaps not of particular interest to growers of nuts in the Northern States, yet brief reference will be made to some of the insect enemies of the pecan. There are two excellent publications on this subject, as indicated in the list of titles above. I should urge all interested in nut culture to obtain these papers, since some of the insects treated are quite general feeders and may be expected to occur on most all varieties of nuts.

The secretary also has asked that reference be made to the hickory bark beetle. This is essentially a forest insect and has

been treated by Doctor Hopkins in Circular 144 of the Bureau of Entomology.

Attention should be called to an insect rather recently introduced into the New England States, which will probably attack nut crops, namely, the so-called leopard moth, already indicated in the list of titles on nut insects. This pest will prove a difficult one to control, as it infests the trunk and larger limbs.

The whole question of the control of nut insects is complicated by the often enormous size of the trees, so that operations, effective in the control of insects, say affecting the apple, are not entirely practical. It is a point to be determined whether it will be profitable to spray large nut trees, such as the pecan. In some instances we believe that it will be, and the Bureau of Entomology now has in Florida one of the large power spraying outfits, formerly in use in the gipsy moth spraying, to determine the cost and benefits of such work.

In concluding these brief remarks I wish again to reiterate my pleasure in having the opportunity of appearing before you, and to assure you of the interest of the Department in the insect problems confronting nut growers. Nut culture is bound to increase enormously and insect injuries will probably correspondingly increase. I believe, however, that these injuries will be found controllable, as has been determined to be true in the case of practically all important native or introduced crops.

The Chairman: We are glad that Professor Quaintance has told us about the different bulletins. The secretary will have a list of these. I am now going to call for Mr. Rhodes, who is an expert propagator of Persian walnuts, and he is going to give a demonstration on methods of propagating the walnut.

Mr. Rhodes: I am employed over at Arlington and I have been helping Professor Lake in his work there at the farm. Last year about the 15th of July we put in about seventy-five grafts using the cleft graft, and the side graft, and at the same time we put in some chip buds. Professor Lake has a little instrument which is known as a chip budder. We used an ordinary bandage, such as surgeons have, which we dipped in a mixture of about two parts wax, one part tallow and one part rosin. We put the bandage in when the solution was at a boil—that made it sticky enough to hold to the bud, and then we cut a hole large enough for the bud to come out. We found budding at that season, in August, more successful than grafting. The stocks were about two inches in diameter; we put in grafts anywhere from two to three feet above the ground, sometimes

as many as three grafts. In a great many cases we lost all, and in some cases we lost two. I tried also bench or root grafting, and put in about fifty along about December, and when I took them out in the spring, the scion had covered up nicely, but we had a very dry spell, and through lack of attention, as much as anything else, we didn't get a graft to pull through. I am going to try the same thing this year. Along in July I took several cuttings and put in, and out of ten I got one to live. One proved successful in the soft wood and this coming year I hope to get some of the hard wood kinds to pull through.

In grafting I always try to get the cuts as smooth as possible and to make them in one cut, because if you make a second cut you are bound to make some unevenness in it. These cambium layers have to fit right up flush with the edge of the bark. Then we usually wrap them in raffia. We used also what Professor Lake called a bark graft.

We got about 10 per cent of those to live. We had better success with the cleft graft and the side graft. In cutting the scion for this side graft I usually cut one side a little longer than I do the other which makes the scion lie closer to the stock. We leave the top on. You can put several on each of those stocks.

We were pretty successful with that sort of a graft. For my own personal use, I like this graft for walnuts, and I think we will eventually have better success with that than with any other type.

We put the majority of the grafts in I think about the latter part of June or July.

I have been afraid to cut the top off before the scion has started to grow. There is too great a flow of sap for the small scion to take up and as a consequence it drowns out the scion.

Professor Smith: How far toward the center did you make the cut?

Mr. Rhodes: About two-thirds of the way through.

The Chairman: You go past the middle?

Mr. Rhodes: Yes. The only thing you have to be careful of is not to cut too far, as then there is danger of breaking off.

Mr. Jones: Do you have any particular length for the cut on the scion?

Mr. Rhodes: No. A great deal depends on the cut you make into the stock. I don't like to cut the scion any further up than the depth we go into the stock wood.

Mr. Jones: Any other rule?

MR. RHODES: No, it all depends on the size of the stock. If you get a large stock you can cut it larger.

THE CHAIRMAN: We thank you for these explanations. Mr. Rush is an experienced propagator of walnuts and pecans and I want to give him some time to show his methods. I will ask Mr. Rush to give his demonstration.

MR. RUSH: I am very glad to show you some of my methods. The only difference between mine and Mr. Hutt's is that he is right-handed and I am left-handed.

The propagation of the Persian walnut may be divided into three divisions, the preparative, the operative and the nursery, and one is as important as the other. Good wood, good weather conditions, good technique and after this you must nurse them.

(Mr. Rush gives demonstration of budding.)

THE CHAIRMAN: This is the method I outlined yesterday, but I think Mr. Rush has it better in his hands than I have in my head.

MR. RUSH: It is practically the same. I have a good knife with two parallel blades that can be taken off, and put on the grindstone, and got as sharp as a razor. For some things I use a surgeon's knife.

THE CHAIRMAN: We have with us another very expert propagator from a little farther south. I am going to ask Mr. Wiggins to give us the benefit of his observations along this line.

MR. WIGGINS: I have not had experience in propagating walnuts, except in an experimental way. I have had some experience in the propagation of pecans. Much depends on the condition of the stocks. If they are in a good healthy, vigorous, growing condition, you will do better.

(Gives demonstration on grafting.)

The best time in South Carolina is in August and early September. I use but one method of budding and grafting. It is the only one I am successful with. What you call chip budding, I call bud grafting. I get 95 per cent of chip buds to take in the spring. I get the wood when it is dormant. I can find dormant wood even in May and June. I usually get it earlier than this, but this year it was in May. Part of these trees were in the shade in the orchard and I got the wood from them. Ninety-nine out of one hundred were dormant, and about that many lived. The wood was thoroughly dormant and plump. I cut it right out of the orchard in May or June and got them to live. Of course if you cut scions from the ends of branches, you haven't a chance at all.

One thing to remember in the chip graft is not to cut your chip too thin. If you do you will lose a good many. I go right into it. If you do it right it will hurt your finger so you can only work for two or three hours at a time. It won't dry out so quickly if you cut it thick and will stand a better chance to live. I try to get the scion to fit the first time.

THE SECRETARY: What do you tie it with after you put on the waxed cloth?

MR. WIGGINS: I use a strip of common cloth out of the store. Your fingers will be waxed enough in working so that the strip does not need to be waxed. You tie it after wrapping it.

A MEMBER: Would you protect that with a paper bag?

MR. WIGGINS: No.

A MEMBER: Do you place it on the north or south?

MR. WIGGINS: The point that decides the exact place on the stock is the smoothness and greenness and health of it. I pick out the cleanest and best places. The whole top of the tree is above the graft.

A MEMBER: When do you cut off the tree?

MR. WIGGINS: According to the weather. It takes two or three or four weeks for proper healing. I open up a few and if they are all right, I open all of them. Just as soon as it heals, I cut the top off.

PROFESSOR SMITH: What is your ordinary practice in cutting scions?

MR. WIGGINS: Last year I was sick and got behind with my work so I cut them each day as I needed them. I usually cut them earlier and bury them in a shady place to keep the wood dormant. I can get 100 per cent by chip grafting and in no other way. I don't use the cleft graft at all. The better fit you get in this method of propagating the higher the percentage will run. If you make a fit that is not quite a fit, you will be astonished to lose about 95 per cent. If you are just a little more careful, you might get 100 per cent to grow. I can tell by the way it feels when it is right. I use a crude method but succeed with it. I do four hundred in a half day. What is the use of going to another method when I get good results with this?

PROFESSOR SMITH: You say a half-inch scion on a four-inch stock?

MR. WIGGINS: Yes, on a four-inch stock you get a cut an inch or one and a half inch wide You have a large space that is not covered at all.

PROFESSOR SMITH: They live?

MR. WIGGINS: Yes, of course.

PROFESSOR SMITH: Only touch in spots?

MR. WIGGINS: On top and bottom and on one side. I get cambium together at top—I am careful about that—and then I get on the left side an exact fit but not on the other sides.

THE CHAIRMAN: Have you had much experience with walnuts?

MR. WIGGINS: No. I should think the best results with walnut as well as with pecans would be by cutting the scion wood the year before.

THE CHAIRMAN: This is certainly a very interesting discussion, but I have another grafter here yet. A demonstration by Mr. Jones will close this morning's session.

(Mr. Jones gave a demonstration of cleft grafting stating that he used that method practically altogether.)

APPENDIX

REPORT OF THE SECRETARY-TREASURER

Receipts:		
Dues	$200.00	
Gift	200.00	
Sale of report	10.00	
Advertisement	15.00	
Miscellaneous	7.15	
		$432.15
Expenses:		
Deficit	$17.54	
Reporting convention	47.13	
Printing	355.74	
Postage	66.34	
Typewriting	19.14	
Advertising	6.79	
Expense of secretary to Albany	10.05	
Expense of secretary to New York	2.75	
Miscellaneous	11.72	
		$537.20
Deficit		$105.05

Through the generosity of one of our members the secretary was enabled to issue the annual report, to have other printing done, and to represent the Association at Albany at the conference on the hickory bark borer called by the Commissioner of Agriculture of the State of New York.

It is not likely that this gift will be repeated and it will be a great misfortune if the means for publishing the annual report are not found, as well as for taking up the present deficit of over a hundred dollars.

Of course our membership is increasing rapidly and, in the years to come, we should have members enough to pay our annual expenses, including the publishing of the report. The secretary would like also to have enough to issue reprints or bulletins from time to time.

The secretary asks for instructions in the face of this difficulty and would suggest the appointment of a finance committee, not to include the secretary, and to be composed of persons who will work.

There might be a similar hard-working committee on programme. The secretary is willing to be the clearing house for the Association, but would like to have something to clear besides the cloudy results of his own labors.

The secretary has a list of over six hundred names of persons interested in nut culture, which he thinks should be circularized from time to time with reprints, or bulletins, setting forth the importance of, and the advances in, the art of nut culture.

The secretary would be pleased if each member would send in a new member during the year, would send an advertisement of his own, or some other person's,

business for the annual report, and would pay his own dues promptly on the first intimation from the secretary. Members whose dues for the year are not paid will not receive the annual report and, after a decent interval, their names will automatically drop from the roll of membership and not appear in the next annual report.

Except from a financial standpoint the Association may fairly consider that it has had a prosperous year. Our present membership is 134, an increase of 48 over the number reported at the last meeting. (At date of going to press the membership is 143.)

Three members have resigned and we have lost two by death, Mr. George W. Gschwind of Brooklyn, N. Y., and Mr. W. D. Ellwanger of Rochester, N. Y. (News came during the meeting of the death of Henry Hales of Ridgewood, N. J., the first honorary member of the Association. An account of Mr. Hale's work with nuts appears elsewhere in this report.)

Thirty-one members have failed to pay their dues and have not been sent copies of the report. The secretary asks permission to drop the names of these members from the rolls and that a rule be formulated to guide his action in the future.

That interest in nut growing is increasing is shown by the issuance this year of three catalogues devoted entirely to nuts for northern, or northern and middle, planting. One nurseryman grows nothing else. All are members of this Association and the nuts propagated have all been shown at our meetings.

The work of the secretary during the year, besides the preparation and issuing of the annual report, has been given to answering a large and increasing correspondence, by personal letters and our various bulletins and circulars. The resolutions introduced by the Committee on Resolutions at the last meeting, and ordered by the Association to be printed and distributed as directed in the resolutions, were sent out by the secretary. A number of very complimentary letters in reply to this were received.

Arrangements and announcements were made that all members were to receive a subscription for one year to the *American Fruit and Nut Journal* as a part of their membership, and that new members would receive in addition copies of both the reports that we have issued. This proved very attractive, but unexpected complications have arisen that have kept the secretary busy explaining why he has been unable to fulfil both of these promises.

At the suggestion of Professor Hutt a circular was issued to gather information about the Persian walnut tree in the North. Replies are still coming in and the information obtained has not yet been collated. It shows already, however, that there is a great number of trees in the North; that there are two large centers so far shown, one about Rochester, N. Y., and the other in Ontario, Canada, on the strip of land between Lakes Erie and Ontario, known as the Niagara Peninsula. In both localities reporters speak of hundreds of trees. One grower near Rochester has 225 seedling trees about 27 years old from which he is marketing nuts.

The original trees in these locations are often spoken of as grown from seed brought from Philadelphia at the time of the Centennial Exposition. Another center seems to be about Lancaster, Pa. There it appears that the original trees were brought in by the Germans. Perhaps the Philadelphia trees above referred to had the same origin. This would be a good subject for investigation by some of our Pennsylvania members.

There is a tree, said to bear good crops of good nuts, at Newburyport in the

extreme northeastern corner of Massachusetts. (Specimens were shown at the meeting.)

If not already undertaken by the Government agents, I would suggest the making of a map on which all known bearing trees of the Persian walnut in the East should be located. If not in the Government plan the secretary would undertake to make such a map. In any case he is very anxious to learn as much as possible about these trees and he urges the members to furnish him any knowledge about them that they may have. Circulars to be filled out will be sent on application.

A member has offered to give $25 as a prize to be offered by the Association for the best shagbark hickory nut sent in. This offer came too late to make suitable announcement this year, but it is too valuable not to be accepted and encouraged, and I would suggest that either a special committee be appointed to devise means of offering prizes, with the above mentioned sum of $25 as a foundation, or that the matter be referred to the committee on promising seedlings.

THE CHAIRMAN: I think we should take some action on the secretary's report. It is before the association. What shall we do about it?

PROFESSOR SMITH: I move that the situation of the finances be referred to the executive committee.

A MEMBER: I second the motion.

THE CHAIRMAN: It is moved and seconded that the matter of the financial standing of the association be placed in the hands of the executive committee.

(Motion was carried.)

THE SECRETARY: The next is the election of the Nominating Committee.

THE CHAIRMAN: Are there any nominations for Nominating Committee?

MR. JONES: I place in nomination Professor Smith, Mr. C. A. Reed, Mr. Rush, Mr. Ridgway and Mr. Albert Stabler.

MR. POMEROY: I second that nomination.

THE CHAIRMAN: It has been moved and seconded that these gentlemen be appointed as a nominating committee to nominate the officers for the ensuing year.

(The motion was carried.)

RESOLUTION ADOPTED AT THE ANNUAL MEETING OF THE ASSOCIATION NOVEMBER 18 AND 19, 1913

Resolved, That the Secretary of the Northern Nut Growers Association be instructed to keep "an accredited list of northern nut nurserymen," such list to be made up by the Executive Committee of this Association of such nurserymen as the Executive Committee may feel satisfied make no misrepresentations

as to whether the trees they sell are budded and grafted varieties or as to the specific varieties which they sell, or any other statement calculated to mislead the purchaser to his detriment. The said Executive Committee is to have full authority to make any necessary inquiries into the reputation or practices of any nurseryman, and shall take steps as soon as practicable to make up such an "accredited list," and such list shall consist not only of nurserymen who belong to this Association, but of any nurserymen engaged in the sale of northern nut trees. Such accredited list of nurserymen shall be furnished anyone upon inquiry. The Executive Committee shall have full power in making up this list of accredited nurserymen and shall add to the list from time to time such names as in their judgment shall be entitled to be entered on this list and shall drop from such list any names of such persons as in their judgment at any time violate the standard required for admission to such accredited list. Any nurseryman whose name is to be dropped shall first be notified and permitted to appear before the Executive Committee and be heard and shall, if he chooses, have the right to appeal from the action of said Committee to the Association at any annual meeting, and the majority vote of said Association shall be binding.

PRESENT AT THE FOURTH ANNUAL MEETING OF THE NORTHERN NUT GROWERS ASSOCIATION

At Washington, D. C., November 18 and 19, 1913

Members:

Batchelor, Leon D., Logan, Utah
Close, C. P., Washington, D. C.
Coleman, H. H., Newark, N. J.
Crockett, E. B., Lynchburg, Va.
Deming, Dr. W. C., Georgetown, Ct.
Druckemiller, W. C., Sunbury, Pa.
Fullerton, H. B., Medford, L. I.
Hume, H. H., Glen St. Mary, Fla.
Hutt, W. H., Raleigh, N. C.
Jones, J. F., Willow St., Lancaster, Pa.
Kinsell, Mrs. Ida J., Rock Mills, Pa.
Lake, E. R., Washington, D. C.
Mayo, E. S., Rochester, N. Y.
Pomeroy, A. C., Lockport, N. Y.
Prange, Mrs. N. M. G., Jacksonville, Fla.
Reed, C. A., Washington, D. C.
Ridgeway, C. S., Lumberton, N. J.
Roper, W. N., Petersburg, Va.
Rush, J. G., West Willow, Pa.
Smith, J. R., Roundhill, Va.
Stabler, Albert, Washington, D. C.
Storrs, A. P., Owego, N. Y.
Wile, Th. E., Rochester, N. Y.
Van Deman, H. E., Washington, D. C.

Others:

Editor *Life and Health,* Washington, D. C.
McHatton, Prof., Georgia
Frost, Mr., Boston, Mass.
Stabler, Mr., Jr., Washington, D. C.
Evans, Mr.
Lee, Mr.
Collins, J. F., Washington
Wiggins, J. B., S. Carolina
Waite, M. B., Washington
Quaintance, A. L., Washington
Sober, C. K., Pennsylvania
Davis, Mr.
Rhodes, Mr., Washington, D. C.
Mittlepage, Mrs. T. P., and friends
Pomeroy, Mrs. A. C.
Reed, Mrs. C. A.
Metcalf, Dr. J. B., Washington
Roberts, Horace, Moorestown, N. J.

EXHIBITS

By George W. Endicott, Villa Ridge, Ill.
The Boone chestnut and unnamed Boone seedlings, Nos. 4, 6, 7, 8, 22 and 24. Staminate parent of Boone. Chinquapin x Boone; Boone x Rochester; Boone x Ridgeley; Boone x McFarland. Blair, Burrill. best native, Champ Clark, McFarland, President, Ridgeley, Reliance, Rochester, William P. Stark.

C. K. Sober, Lewisburg, Pa.
Paragon chestnuts.

Mrs. Annie E. K. Bidwell, Rancho Chico, Chico, Cal.
American sweet chestnut, Italian chestnut, butternuts, black walnuts, I. X. L. almonds, seedling filbert, Bidwell pecan.

D. H. Hulseman, Lakeside, Wash.
Chelan and Hulseman walnuts.

Fancher Creek Nurseries, Fresno, Cal.
Eureka, Placentia Perfection, Neff's Prolific walnuts.

A. C. Pomeroy, Lockport, N. Y.
Pomeroy walnuts.

C. S. Ridgeway, Lumberton, N. J.
Ridgeway walnut.

E. S. Mayo, Rochester, N. Y.
"Thompson-Avon" walnut. Unnamed seedling.

W. S. Devoe, San Luis Obispo, Cal.
Santa Barbara walnut.

Frank P. Andrus, Almont, Mich.
Unnamed seedling walnut. Butternut.

E. R. Lake, Washington, D. C.
Gingko nut. Pili nuts.

Arlington Farm.

Juglans sieboldiana. Juglans australis, probably from South America. Twenty-three exhibits of almonds from different California growers.

J. G. Rush, West Willow, Pa.

Lancaster, Nebo, Hall, Rush and Kaghazi walnuts, Barcelona filberts, Weiker and La Fevre shellbark hickories.

Prof. V. R. Gardner, Experiment Station, Corvallis, Oregon.

Eleven varieties of filberts.

W. C. Reed & Son, Vincennes, Ind.

Beard, Indiana, Kentucky, Letcher, Luce, Major, Niblack, Posey, and Warrick pecans.

T. P. Littlepage, Boonville, Ind.

Kentucky pecans.

J. F. Jones, Lancaster, Pa.

Lancaster and Holden walnuts, Weiker shellbark and Kirtland shagbark hickories, Barcelona filberts and photographs of the Lancaster tree. Ninety-six exhibits of southern grown pecans by various exhibitors.

WILDER MEDAL FOR EXHIBITION OF NUTS

The American Pomological Society awarded the Northern Nut Growers Association a bronze Wilder Medal for the exhibition of nuts at the fourth annual meeting of the Association at Washington, D. C., November 18 and 19, 1913.

GEORGE W. ENDICOTT—THE BOONE CHESTNUT

E. A. Riehl, Alton, Illinois

George W. Endicott was born in Belmont County, Ohio, July 25, 1837. He joined the Forty-eighth Illinois Infantry in 1861, serving nearly three years, when he was discharged owing to wounds received. Then he went to farming in Wayne County. In 1867 he settled at Villa Ridge, Ill., devoting himself to fruit and vegetable growing, in which he was eminently successful. Mr. Endicott was a man of strong character and a leader in his community. Energetic and up to date in all his operations, he procured and tested all kinds of new fruits as fast as introduced. He died at his home November 14, 1913.

Of the greatest interest to the nut growers of this country was his work of creating the Boone chestnut. About 1888 Mr. Endicott conceived the idea of producing a cross between the American and Japan chestnuts and getting one combining the sweetness of the native with the large size, early ripening and young bearing habits of the Japan. He encountered an obstacle in the fact that the Japan blossomed before the native and it was not until seven years later that he found a native blossoming early enough to make the cross. In the spring of 1895 he carefully hand pollinated some Japan Giant with the pollen of this early flowering native, sacking the same to prevent other pollen reaching them. The seed so produced was planted in the spring of 1896 in rich soil that had been used as a vegetable garden. One of the seeds so planted bore six burs in 1897, eighteen months after planting the seed and has produced crops every year since as follows: 1898, 1 pound of nuts; 1899, 3 pounds of nuts; 1900, 5 pounds of nuts; 1901, 6 pounds of nuts; 1902, 8 pounds of nuts; 1903, 12 pounds of nuts; 1904, 17 pounds of nuts; 1905, 25 pounds of nuts; 1906, 31 pounds of nuts; 1907, 43 pounds of nuts; 1908, 50 pounds of nuts; 1909, 56

pounds of nuts; 1910, 5 pounds of nuts (early bloom killed by late freeze); 1911, 80 pounds of nuts; 1912, 76 pounds of nuts; 1913, 140 pounds of nuts—a grand total of 568 pounds from the time of planting the seed seventeen years ago.

This nut is of very good quality, has large size, ripens early and comes into bearing very early. Has been well tested and proven to be one of the best chestnuts we have. It has but one fault, it is very hard to propagate by either budding or grafting. Mr. Endicott and others have grown many seedlings of Boone, but none are in all respects as good as the parent.

Mr. Endicott did a good work in producing the Boone chestnut and deserves the thanks of the nut growers of this country.

LETTER FROM G. H. CORSAN, TORONTO, CANADA

My place of 15½ acres just west of Toronto, is in a small valley containing sandy, gravelly and clay soils, while the creek bottom land is rich black humus. My efforts are purely experimental and the losses do not worry me as I simply wish to know what will succeed in this district. Peaches and grapes grow on my place.

Last winter I bought twelve Paragon chestnut trees from Colonel Sober. All twelve are alive and looking well and this fourth day of November are just turning color and dropping their leaves. You will probably remember that of the three samples that Colonel Sober displayed at the convention last year I took the walking stick. I had to go to Columbia and other South Carolina points for three weeks afterwards, so that it was well into January before I finally got the "walking stick" planted. Well, it is also alive and has that well-known Paragon form, five fan-shaped shoots above the graft.

I planted seeds from all over the world, in rows, and of ten bushels of black walnuts only five nuts sprouted. On the other hand, every pecan came up. Hickories and English cob nuts behaved a little better than the black walnuts. I slip a little collar of tar paper over each little tree to protect it against field mice, rabbits and ground hogs. Red squirrels trouble me the least of all the pests as I cannot keep them out of my double section wire rat trap, and the pet stock men give my boys 30 cents apiece for them.

I also bought a dozen Pomeroy walnuts last winter for experiment. They are all alive but the extraordinary late and early frosts were hard on them and nipped them down three inches from the top where they again sprouted out. This occurred to all but one tree which positively refused to take any notice of either the late or the early frost. I consider this one tree worth *many* times the money I paid for the dozen.

My experiments are only two years old but I will mention that my English filberts or Kentish cob nuts are doing well, also my Battle Creek persimmon seedlings that I planted in an exposed position two years ago.

Seeds from those Battle Creek persimmon trees can be procured from Dr. J. H. Kellogg by writing him. They are the two most northern persimmon trees which I have discovered so far. The fruit is good to the taste and the trees have lived through terribly cold winters. I mention this as many of you are fruit growers also and want to get persimmon stock in order to graft the Japanese persimmon on. The female tree every second year is loaded to the point of breakage and should do well for stock.

Speaking about procuring seeds from dealers, I can get here and there for one cent as much as I have to pay the dealer a dollar for. For instance, while passing through Phoebus, Va., I asked a lady what she wanted for Juglans sieboldiana and she said 5 cents a quart or 35 cents a peck. She only got 16 bushels from a 20-year-old tree! They were bigger and better specimens than I got from Japan at about five nuts for one dollar, postage extra.

Then I wrote to a gentleman who had a small tree of Juglans cordiformis in Ontario and he said that he only had a bushel which he was expressing to me and to send him a dollar! Think, and the Japs sent me three nuts for one dollar!! A lady at Niagara Falls, Ontario, told me that she had a little tree of J. sieboldiana so I asked her the price and she sent me half a bushel and said to pay the express charges which were a quarter!

And it is the same way with these forest seed merchants, they send me for dollars the seeds of pinus edulis and pinus Koriensis that it would take a powerful microscope to discern, and I afterwards bought of a fruit merchant in Milwaukee a big glassful for a nickel!

Roadside planting is a failure, for, besides rodents little and big, there are all kinds of animals from sheep to horses to destroy them, so that I have to plant all my trees at least four feet within my fence line.

Juglans Mandshurica seed I find impossible to procure so far. There are two magnificent trees in Toronto planted by an old man who is dead now. These trees show no sign of ever having been winter killed and are 13 and 19 feet high but have not fruited yet. The leaves are very long and the trees resemble the stag horn sumach, except that they are distinctly Juglans in appearance; but the growth of the year's shoots is thick and long like a coppice growth.

LETTER FROM W. C. REED, VINCENNES, INDIANA

The Indiana pecan tree bore a splendid crop of about 3½ bushels. The Busseron also had a good crop on all the old wood and some on the new wood. The Busseron is just recovering from a severe cutting back by the owner and should be in shape to give a good crop next year. Other pecans in the vicinity bore a very light crop.

The Niblack bore only a few nuts this year. Butterick had a very good crop for an off year, some five bushels as reported to me, and they were well filled. This tree is very large, 4½ feet in diameter, 90 foot spread, located near Grayville, Ill.

The writer and my son, M. P. Reed, have top worked quite a number of large black walnuts, ranging from 3 to 9 inches in diameter. They were cut back last spring and budded in the new growth this summer, setting from 20 to 40 buds in some of the trees. Buds of the Hall, Pomeroy and Rush have taken well and look very promising. Of other varieties only a limited number have taken. We will top work several large trees this coming summer and should get results soon from these.

Pecans in the nursery have made a very satisfactory growth. The stand of buds was only fair, in some cases poor. We still have a limited number of Indiana and Busseron trees but the supply of other kinds is exhausted for this year.

We have planted 600 pounds of pecans and 50 bushels of walnuts and with the seedlings we have on hand in nursery hope to have plenty of stock to work in the future.

We had a splendid stand of grafts of the Major pecan the past spring and some of these made 4 feet of growth and calipered ¾-inch, for grafts set May 1st.

THE LATE HENRY HALES AS A NUT CULTURIST

H. W. Hales, New Jersey

About 1876 he and the celebrated writer and agriculturist, Andrew S. Fuller, made extensive experiments with the large English filbert,—mostly of the Kentish cob varieties. These proved unadapted to the climate as the trees seemed to run all to growth and bore very few nuts. About this time, also, very extensive plans were laid to propagate by grafting the Hales Paper Shell Hickory. There is probably no more difficult tree in existence to graft than the hickory as, owing to the extreme hardness and close grain of the wood there is always an uncertainty about their uniting permanently, consequently the percentage of perfect trees was always small. Mr. Hales tried all kinds and methods of grafting, some were done on stocks that stood naturally in the fields, others were grafted in greenhouses, then again, others were tried in frames or sashes, and large numbers were grown in pots, and success was only attained after years of time and thousands of dollars were spent. Mr. Hales was also an enthusiastic grower of the English or European walnut and one tree which grew on his farm at Ridgewood was grown from seed given him by ex-Mayor Daniel F. Tieman of New York City many years ago.

Japanese walnuts were also grown on the farm at Ridgewood and some of these are now bearing. A large number of Japanese chestnuts were planted some years ago, and while these bore heavily for a short time they nearly all succumbed to the chestnut blight. There is some difference of opinion among nut growers on the subject, but Mr. Hales was always of the opinion that the chestnut blight was introduced into this country with the Japanese trees, and that when the Japanese trees were gone the disease then spread to the native trees. The Hales Paper Shell Hickory, it may be remarked, still holds the palm as being the largest and thinnest shell nut, and it was only by the most persistent and painstaking efforts that Mr. Hales succeeded in propagating them at all. A large number of chestnuts were grown by Mr. Hales, such as the Numbo and other varieties. Some of these were said to be purely American varieties and others hybrids, or crosses. All of the hybrid varieties seemed to lack the hardy constitution of the American and although some of the nuts were very large he did not succeed with them in the long run as well

as with the native varieties. Pecans of all kinds were tried by him and choice specimens were obtained from all parts of the country. Like the hickories these were grown and grafted in different ways and the percentage of good results was always much larger than the hickories. Grafting the hickory on the pecan was of course tried, and this proved one of the best ways of propagating the hickory. Everything that he could possibly think of or do was brought to bear in his efforts at nut culture and it is some satisfaction to know that many nut lovers will have the benefit of his work and efforts, long years after he has passed away, the hickory especially being a very slow growing and long lived tree.

ABSTRACT OF PAPER BY HUMPHREY

Filbert. Black knot, *Cryptosporella anomala*

HUMPHREY, JAMES ELLIS. Mass. Agr. Exp. Sta., 10th an. rept., 1892, p. 242–243.

The author describes this fungus as killing the canes of the European hazel, *Corylus avellana,* at Palmer, Mass. The fungus appears in the form of protuberances with elliptical bases that burst the bark and rise rather thickly from the affected portions of the branch. The diseased portion is sunk below the surface of the healthy part. The interior of the protuberance, which is the fruiting part of the fungus, contains numerous black, flask-like structures whose tips reached the surface. Within the cavities of these flasks are formed the very numerous spindle-shaped spore cells, each containing, when ripe, eight colorless elliptical spores. The author noticed that the inner bark on the part of the branch occupied by the fungus is reduced to a narrow black line between the wood and the outer bark. This reduction in the thickness of the inner bark explains why the surface of the affected parts is sunken. If the entire circumference of a cane becomes involved, the result is that it is girdled, and the part beyond necessarily dies. The attacks of this fungus on the host-plant are essentially similar in their results to those of the black knot of the plum, though the immediate effect on the inner bark is here one of atrophy, while in the latter case it is one of hypertrophy. The fungus is also related to the black-knot fungus on the plum, but its life-history is not yet known. There may be other spore forms in its life cycle, and therefore it is impossible to give any more definite suggestions for avoiding it than to recommend that infected branches be cut away well below the point of infection and burned as soon as they are seen to be infected.

THE TRUTH ABOUT TREE PLANTING WITH DYNAMITE.

[NOTE BY THE SECRETARY.—As planting with dynamite has been especially recommended for nut trees, on account of their long tap roots which have the habit of growing down until they reach permanent water; as there has been some difference of opinion among horticulturists as to the merits of tree planting, in general, with dynamite; and in order that nut growers may know how to use this method as advised by the dynamite makers, in case they may wish to try it in setting their trees, the following description of the method advised, from the pen of Mr. George Frank Lord of the E. I. du Pont de Nemours Powder Company, is here printed.]

During the past two years there has been considerable discussion in the agricultural press on the merits of dynamite in tree planting. The majority of orchardists who have tried the new method are enthusiastic over the results, but now and then we hear someone condemning the practice, and stating that they have tried it with poor results. It would appear from investigation that the theory of the use of dynamite in tree planting is a good one, but that the practice is sometimes incorrect, and hence fails to produce the desired results.

Purpose of Dynamiting for Tree Planting:

In the first place, to secure successful results it is necessary to understand clearly what the dynamiting is to accomplish. Some orchardists and farmers have the idea that the purpose of the dynamite is to excavate the hole for the tree and save them the trouble of shoveling out the soil. This is a wrong theory.

The object of dynamiting for tree planting is to break up the subsoil at a depth of from three to five feet so as to create a soil sponge or water-absorbing area twelve or twenty feet in diameter around and underneath the spot where the tree is to stand, so that the heavy rainfalls and melting snow of spring may be conserved in the subsoil to take care of the tree during the long dry summer.

If the force of the dynamite is used merely to blow out the soil and make digging unnecessary, it is unreasonable to expect the dynamite to do this underground work. On the other hand, when the charge is properly placed at a depth of about three feet and tamped in just enough to confine most of the force of the explosion in the subsoil, the blast will not only crack and pulverize the subsoil, but will also break up the ground around the bore hole clear to the surface, and throw it into the air, possibly a foot. It is then a very easy matter to excavate the hole for planting.

Necessary Soil Conditions:

There is no economy nor advantage in using dynamite in a soil that is loose and sandy to a depth of three or four feet. The weakness of this soil is that it allows water to percolate through it too rapidly, hence dynamite would be harmful rather than helpful under such conditions, but no matter how loose the top soil or plowed soil may be, if it is underlaid by more or less impervious clay, or even a heavy loam, dynamiting under proper conditions will certainly increase its water-storing capacity, and also make it easier for the roots to grow downward and deep.

The proper conditions referred to are that the blasting must be done when the subsoil is relatively dry, otherwise it will not crack or pulverize. Every farmer knows the disadvantage of plowing wet top soil. It is equally disadvantageous to blast a wet subsoil. Of course, some subsoils are always in a more or less damp condition and never get thoroughly dried out, but they may be safely and advantageously blasted when they are in their dryest condition.

Water-logged soil should never be blasted except for the purpose of ditching it or tiling it so as to get it into a proper condition for blasting. The ditching may be done economically and quickly with dynamite, and in many cases this will answer just as well as the more expensive tiling. When the ditching or tiling has drained this subsoil, it may then be safely blasted.

Filling the Pot-Holes:

In any heavy soil the explosion of the dynamite tends to form a cavity in the immediate vicinity of the cartridge, varying from one to two feet in diameter. The heavier or the wetter the subsoil, the larger this cavity is likely to be. After the blast the top soil should be shoveled out and laid to one side; next shovel out the subsoil and lay it on the other side of the hole; continue this excavation until the pot-hole is reached, then be careful to fill this hole reasonably tight with subsoil, the object being to prevent the possibility of soil falling away from the roots of a tree after planting, and leaving it suspended in the air. This is the cause of the death of trees planted in dynamited holes which some unsuccessful experimenters report. It takes a little time to fill this pot-hole, but the many advantages of planting trees properly in dynamited holes more than offset this extra time and trouble required to properly prepare the hole.

Planting the Trees:

After the pot-hole has been filled, continue to shovel in subsoil until the proper height is reached for planting the tree, then throw in half the top soil and spread the roots on that in their natural positions, then throw in the remainder of the top soil, next get in the hole and walk around the tree several times, tramping the top soil down tight around the roots so as to remove all large air spaces that surround the roots, then fill the hole to the surface with subsoil. Planting a tree in this way costs a few cents more per tree than the old way, but since the tree can only be planted once and the comparative records as to loss of trees the first year after planting, show an average advantage of 30 per cent. in favor of dynamited trees, namely, the loss is cut down from three to five trees per hundred, a dynamited tree grows so much more vigorously and produces fruit from one to two years earlier, therefore it pays to take the extra trouble and do the job right.

The editor of *Successful Farming* was at one time skeptical as to the use of dynamite in tree planting, but has been convinced from personal observation of its use in large commercial orchards, and from letters from various subscribers, that it is an important and valuable innovation in horticulture, provided it is used with proper care and discretion.

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Sage, Hollister, Waterbury

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The United States Department of Agriculture at Washington, D. C., will always respond to requests for information, referring them to the best authority available, many of whom are to be found in the various bureaus.

The secretary of this Association is always glad to do his best when no better authority is to be found. He intends in the future to refer many inquiries to those who have a better knowledge of local conditions.

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THE CHESTNUT BLIGHT AND IMMUNE HYBRIDS.

To persons who are interested in growing chestnuts, the following papers are of importance. They are published in the *Journal of Heredity* for January, 1914, Paul B. Popenoe, Editor, 511 Eleventh St., N. W., Washington, D. C.

"The Chestnut Bark Disease," by Haven Metcalf, United States Department of Agriculture.

"Chestnut Breeding Experience," by Walter Van Fleet, United States Department of Agriculture.

"Chestnut Blight Resistance," by Dr. Robert T. Morris, New York City.

The following important publications are not listed in Circular No. 3:

Walnut Culture in California. Walnut Blight. Bulletin 231, Agricultural Experiment Station Berkeley, California, August, 1912.

The Persian Walnut Industry in the United States. By E. R. Lake. Bulletin 254, Bureau Plant Industry United States Department of Agriculture, February, 1913.

Bulletin No. 1. Yamhill Walnut Experiment Station, MeMinnville, Oregon, January 2, 1914.

NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

FIFTH ANNUAL MEETING

EVANSVILLE, INDIANA
AUGUST 20 AND 21
1914

NORTHERN NUT GROWERS ASSOCIATION

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Knipe, Irwin P., Norristown
Lovett, Mrs. Joseph L., Emilie, Bucks County
Martz, Walter C., Lebanon, care of Lebanon National Bank
Meehan, S. Mendelson, Thomas Meehan & Sons, Germantown
Moss, James, Johnsville, Bucks County
Preslar, C. F., 524 Grand View Ave., Pittsburgh
Rush, J. G., West Willow
Schmidt, John C., 900 So. George St., York
Smitten, H. W., Rochester Mills, R. 2
†Sober, Col. C. K., Lewisburg
Thomas, Joseph W., Jos. W. Thomas & Sons, King of Prussia P. O.
Twaddell, E. W., Evergreen Nurseries, Westtown
Webster, Mrs. Edmund, 1324 So. Broad St., Philadelphia
Wister, John C., Wister St. and Clarkson Ave., Germantown
Wright, R. P., 235 W. 6th St., Erie

†Life member.

TENNESSEE

Van Syckel, Egbert D., D.D.S., Trenton

UTAH

Batchelor, Leon D., Horticulturist, Utah Agricultural College, Logan
Pendleton, M. A., 3 Mozart Apartments, Salt Lake City

VIRGINIA

Crockett, E. B., Lynchburg
Parish, John S., Eastham, Albermarle County
Roper, W. N., Arrowfield Nurseries, Petersburg
Shackford, Theodore B., care of Adams Brothers-Paynes Company, Lynchburg
Smith, Dr. J. Russell, Roundhill
Von Ammon, S., Fontella

WEST VIRGINIA

Hartzell, B. F., Shepherdstown

CONSTITUTION AND RULES OF THE NORTHERN NUT GROWERS ASSOCIATION

Name. The society shall be known as the NORTHERN NUT GROWERS ASSOCIATION.

Object. The promotion of interest in nut-producing plants, their products and their culture.

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the approval of the committee on membership.

Officers. There shall be a president, a vice-president, and a secretary-treasurer; an executive committee of five persons, of which the president, vice-president and secretary shall be members; and a state vice-president from each state represented in the membership of the association.

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the subsequent year.

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

Discipline. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

Committees. The association shall appoint standing committees of three members each to consider and report on the following topics at each annual meeting: first, on promising seedlings; second, on nomenclature; third, on hybrids; fourth, on membership; fifth, on press and publication.

Northern Nut Growers Association

FIFTH ANNUAL MEETING

AUGUST 20 AND 21, 1914

EVANSVILLE, INDIANA

The fifth annual meeting of the Northern Nut Growers Association was held in the Evansville Business Association Hall at Evansville, Indiana, beginning August 20, 1914, at 10 A. M., President Littlepage presiding.

THE PRESIDENT: The fifth annual meeting of the Northern Nut Growers Association will now come to order, and I have the pleasure of introducing to you Dr. Worsham who represents the Mayor of Evansville.

DR. WORSHAM: Ladies and Gentlemen of the Northern Nut Growers Association:

Some men are born to greatness and others have it thrust upon them. I stand in the position this morning of a man that has had his greatness thrust upon him. The secretary of the Evansville Business Association, who frequently takes liberties with me, told me a few minutes ago that, in the absence of our Mayor, I was to welcome you.

We extend to you a most cordial welcome to our thriving city. We are always glad to have associations of this kind meet with us, because they bring to us new ideas and new thoughts.

As I looked upon those nuts this morning my mind returned to the time when I was a boy, when my father, although a splendid business man who took advantage of most of the opportunities that presented themselves to him, neglected one of the best he had in selling one hundred and twenty-five acres of land across the Ohio River here, upon which there grew a number of native pecans. The only time we ever had any pecans from that place was when we got a German over there, direct from Germany. He couldn't speak a word of the English language but my father said to him, "Keep the boys out and get some pecans." He went down there with a dog and a gun and we got more nuts that year than ever before or since.

This city has the distinction, as I have learned since I came into the hall, of being the center of the nut growing district of the northwest. Another honor that our splendid city has. As you know we are here in the largest hardwood lumber market in the world; we have the cheapest and best coal of any place in the world; we have the greatest river facilities of any city along the Ohio River; we have six main arteries of railroad into our city, so it is easy to manufacture, easy to ship and easy to dispose of the products of our business in this grand, beautiful and well situated city.

Now gentlemen, remember that Dr. Worsham's telephone is 213, that I am representing the Mayor and Business Men's Association, and that we are perfectly delighted to have you with us. I hope you will have a good time. I thank you.

THE PRESIDENT: Dr. Robert T. Morris will respond first to Dr. Worsham and afterwards Mr. Potter.

DR. MORRIS: Mr. Chairman, Representatives of the Business Men's Association, Ladies and Gentlemen: In Chicago, I met an Englishman who told me he was going to "Hevansville." I did not know just where he meant but after hearing Dr. Worsham's speech, I understand.

This is no doubt one of the coming cities of the world. You have here the field that was fought for by the early settlers and the Indians, and the field that is to be the scene of many wars in days to come.

In the days to come, perhaps a thousand years from now, there may be four or five people to the acre living under conditions of intensive cultivation. This is just the sort of land that will support a population to the best advantage, and you have here conditions suitable for the crop that is to be the crop of the future. People do not fully utilize nature's resources until there is need for doing so. We have depended upon the cereals and the soft fruits and things of that sort, just as the early Indian depended upon the deer and the beaver. The time came when his beaver and his deer disappeared. We, like the Indian, take up first the development of simplest things in plant life. Later, under intensive cultivation, we shall be enabled to support a very much larger population on fewer acres.

We find that nuts contain starch and proteids in such proportion that they will fairly well take the place of meats and of other starches.

Now, this is not an opinion which is individual alone, but is the

conclusion of authorities after examination of data. Chemical examination of nuts has been made by our Department of Agriculture at Washington and by chemists elsewhere. The nut crop, then, is to be perhaps the staple food crop for the people of the United States one thousand years from now, when we are depending upon methods of intensive cultivation for the annual plants.

It is true, of course, that three thousand years before Christ, the Emperor Yu developed in China a system of agriculture that is better than any European or American system today both as to production and transportation—perhaps including distribution. At the present time China is supporting a larger population to the acre than any other country.

All this comes to mind in response to the address of welcome by Dr. Worsham. Here at this point of our United States, there is already a center of the new movement for the development of the great future food supply of the world, a nut nursery center. Here we find also another feature of great consequence from the economic and politic side. We find honest nurserymen. That is a very important matter. As nations advance in culture the moral side develops, and as the ethical side develops there will be better representatives in the trades and in all callings. The nursery business is near to nature and for that reason simple people have assumed that nurserymen were nearly as white as snow. Those of us who have had some experience with them, know what it means to find honest ones. We deeply appreciate the fact that in this part of the country honest nurserymen are making a name for themselves and for America.

I know Evansville not only in this way that I have been speaking of but also in a professional way because of its doctors. There are two or three or four of the Evansville doctors—you do not know that as members of this Association, but I know it as a member of our great profession—who have placed Evansville upon the map. This city is best known throughout the United States in the medical profession because of some three or four Evansville doctors of the present and past.

Therefore it is with a double pleasure that I respond to the address of welcome given by Dr. Worsham.

The President: We will now hear from Hon. W. O. Potter of Marion, Illinois.

Mr. Potter: Mr. Chairman, Ladies and Gentlemen: This meeting to me is something out of the ordinary. I can remember that when I was a boy I knew every good hickory nut tree in the

community where I was raised, but after I left my native heath and went into the practice of law and got into politics, I forgot all about the hickory trees until just a few years ago when, by accident, I picked up a nut journal. I don't know how it came into my possession but I got it and I read some article on the Indiana pecan, and I read an article on the development of nut trees in the south, and I got interested and commenced studying the subject. I wrote to the Department of Agriculture and got some articles on nut culture from Mr. Reed and others and became still more interested.

However, nut culture doesn't mix well with politics or law, and, therefore, it is more or less of a side issue with me. I have gone into nut culture only on a small scale. On my lot in the city of Marion where I live I have set out some pecan trees, and after a hard battle in court all day it is quite a pleasure to get home in the evening and to pull off my coat and to get on some old clothes and go out among my trees. There is nothing better to get one's mind off the daily combat of life.

I was very much impressed with Dr. Worsham's address of welcome and also Dr. Morris's response. I believe that this country is beginning a new era; we are going to experience a metamorphosis. I think we will shed this old shell, take on a new dress and start afresh.

I presume it is here as in Illinois where I was raised. Our farmers came from the south principally, and about all they knew of farming in those early days was to raise corn and some tobacco, but mostly, through our section, corn, and in a few years they corned the land to death. You can go through our country and see old hillsides red with clay and farmers barely eking out an existence. Those people will never be much better off than they are now, but as they pass off and the newer generation comes on, departments of agriculture and horticulture will be organized in the universities, where it has not already been done, and the farmers will be a class of people right up to date. Modern civilization tends to drive the sons back to the farm and that is overdone sometimes. People think they want to go to farming when they don't. We ought not to take up this idea "back to the farm" too largely at once but gradually grow into it. I know what it is to be on the farm and work hard day after day; there is no chance for us under the old conditions; but in higher forms of agriculture or horticulture the American people will find the greatest benefits and pleasures. It gets monotonous for a man who has a profession to stick to that all the time, day in and day out without change, week in and week

out, year in and year out, and he gets to driving in a rut. If he will take up a side line it will do him much good. I have gone into nut growing for recreation, not profit, and I think it is an occupation most conducive to a strong mind and a healthy body.

This country is getting to a point where we are going to have more producers. We have too many consumers in this country. We talk about the tariff and whether it raises or lowers the price of articles. That is neither here nor there. The thing that will control the prices of foods is the amount of food produced. As Dr. Morris said awhile ago we don't need so much meat as we used to think we needed nor so many other kinds of foods. All the food elements that keep man alive and his body in a healthy condition are contained in nuts, fruits and things of that character, and this to a great extent will eliminate the need for meats. Meat is getting scarce and high. Beef steaks and pork chops are a great deal higher than they formerly were and some of us who are not making as much money in our professions as we need will have to find something else to take the place of them. It seems to me that the solution of the problem is in the production of nuts. The peanut is being manufactured in a great many ways and we are using them on our tables daily, and it will only be a few years when the pecan will be fixed up in as many different ways.

The hickory nut I think is another great nut of this country and great attention ought to be paid to it. Its culture is still in its infancy. I believe that in a few years the hickory nut and pecan will help solve the food problem.

I would not know how to graft any kind of a tree. What trees I need I buy from some good responsible nurseryman and let him do the work of grafting.

I am glad to be a member of this association, although this is the first meeting I have ever attended. I get a lot of enthusiasm from the other members and I have had lots of information from being a member of this association.

I want to thank you, ladies and gentlemen, for listening to my remarks which I had no thought of making. What I have said has been at random.

Dr. Morris: When I was speaking a minute ago I left out one idea that is clever, and I want to get it in although it belongs to Professor Smith. When we get to the point of intensive cultivation we are to have the two-story farm. We will have the tree which will be the second story and will furnish our meat, and under-

neath we will have our small crops. In that way we will have a two-story farm.

THE PRESIDENT: That is a very good idea, Dr. Morris, and I am glad you got it in. We are very glad to have the remarks by Dr. Morris and Mr. Potter. Mr. Potter has been in the legislature and we are pleased to know that there is one member of a legislature in the United States who does not know how to graft.

MR. POTTER: I am sorry you said that. I wish you had left that out. I was there when Lorimer was elected.

THE PRESIDENT: There is nothing that would cure a legislature of grafting quicker than horticulture.

The chair desires to make an announcement of the program. This morning, there will be the usual talks and papers. We will adjourn at 12 o'clock and meet again at 1 o'clock for the afternoon session until 5 o'clock, at which time the members of the Association and visitors are invited by some of the citizens to take an automobile ride to see the city and the different industries, which I am sure we will all be glad to do. This evening at 8 o'clock there will by a lecture by Mr. C. A. Reed of the Department of Agriculture and he will us show one of the best collections of lantern slides in existence. Everybody is invited, whether members of the Association or not, including the ladies and children.

Tomorrow morning at 7:15 we will take the Rockport traction car here, getting off at Sandale, at which place we will be met by wagons and we will go to Enterprise where you will see a great number of seedling pecan trees of all ages. They are bearing, the limbs hanging down close to the ground, and there will be an excellent opportunity to see the nuts on the trees at close range.

A gasoline boat will meet us at Enterprise between 12 and 1 and we will return to Evansville tomorrow evening, via the river, stopping at proper points, and be in session again at 8 o'clock, finishing up the business of the Association with a lecture by Col. C. K. Sober of Pennsylvania, the great chestnut producer. He has a great many lantern slides and will tell you many things of interest. He is one man who is working earnestly and tirelessly to combat the chestnut blight.

The next thing on the program this morning will be the report of the secretary of the Association, Dr. W. C. Deming.

THE SECRETARY: I have the honor to report as follows:

REPORT OF THE SECRETARY–TREASURER

Deficit, date of last report	$105.05	
Expenses:		
Washington meeting	10.46	
Reporting convention	45.00	
Printing report	217.58	
Miscellaneous printing	23.25	
Postage and stationery	42.84	
Membership A. P. S.	2.00	
Stenographer and multigraphing	7.20	
Express, carting, freight	3.36	
Exchange on checks	.90	
Telephone	.25	
		$457.89
Receipts:		
Dues	$273.00	
Postage	5.07	
Advertisements	69.05	
Contributions	104.00	
Sale of report	4.00	
Bills receivable	10.00	
		$465.12
Balance on hand		$7.23

It was necessary to take out a membership in the American Pomological Society in order to be eligible to receive the bronze Wilder medal awarded for meritorious exhibit of nuts at the Washington convention.

In response to an appeal sent out by the secretary for assistance in defraying the expenses of publishing the report, thirteen members contributed. There was one contribution of fifty dollars, one of twenty-five dollars, several of five dollars and others of lesser sums.

Two advertisements are still not paid for.

It is evident that the income of the association from regular sources is not at present sufficient to pay the expense of printing the annual report, in addition to the necessary expenses of maintenance. It may be possible to reduce the expense of printing the report by omitting cuts and by printing a smaller number of reports, though the saving from the latter expedient would be small.

It seems to be the opinion of some of our members, and it is certainly a good business principle, that we should not undertake the issuing of an annual report until the funds for paying for it are in hand. I would renew my suggestion of last year that a proper committee be authorized to take measures for collecting the funds necessary for this purpose. During the past year a few of the members voluntarily constituted themselves a committee and succeeded in collecting a considerable sum from advertisements which appeared in the report.

It would certainly be a pity to interrupt the regular appearance of the report of our annual meeting.

Seventy-five new members were added during the year, or rather during the nine months elapsed since the meeting at Washington. Since the organization

of the Association 212 persons have become members. We have now 132 paid-up members. I feel certain that some of those who have not paid up do not desire to sever their connection with the Association. There have been but three resignations, one of whom gave as his reason "persistent knocking by members of the Association of pecan promotions in the South." No death among our members have come to the secretary's knowledge.

Many new members came in at the Washington meeting. A number of others joined as a result of the publicity given the Association by several articles from the pen of one of the members which appeared in various publications. A still larger number appeared to be attracted by the offer which the secretary took upon himself to make, of the two first reports as a premium for new members on the payment simply of the postage for forwarding them. This action of the secretary was generally approved by the members of the executive committee, though there was some criticism from one or two members of the Association. But it seemed to the secretary better to make this attraction for new members, and to get out the reports where they might do some good, rather than to have so many of them sagging the beams in his attic. The secretary would suggest that in the future he be authorized to offer a complete set of the reports to all new life members, and to other new members the opportunity to buy the back reports at a reduced sum, say 50 cents, or even 25 cents each. This would give a little income toward the expenses of the Association. The copies of our reports are assets and should be realized on.

The field meeting held at the farm of Dr. Robert T. Morris at Stamford, Connecticut, on August 4 was well attended and was instructive and enjoyable. A full account of the meeting will appear in the *American Nut Journal.*

The recent establishment of this journal, partly through the efforts of members of the Association, is a cause for congratulation. We have once more a high class and attractive monthly periodical in which to exchange experiences and by which the public may be reached. Every member of the Association should feel a personal interest in making this journal a success and should seek the opportunity to send to the editor any items of interest to nut growers. Anything relating to his subject is of interest to the enthusiast. The more personal such a journal is made the better. It should not be monopolized by the so-called experts. Everyone interested in nut growing ought to feel it a duty, and consider it a privilege, to communicate scraps of information, little suggestions and, above all, questions and requests for information and advice. Even a little controversy would add spice. Too much harmony becomes insipid. This journal is as much for scrappers as for the men of peace. And, let me quickly add, the women too, suffragists, suffragettes, and antis and those who don't care. Twelve women are members of the Association and women are going to take a large share in nut growing and find in it a profitable and interesting occupation.

Arrangements are being made with the publishers of the *American Nut Journal* whereby membership in our Association may include subscription to the *Journal* at a very small increase in the cost of membership. If we can offer membership and the *Journal* for $2.50 in advance and the back reports for 50 cents apiece, or the three reports for $1, and send notice of this to our list of about a thousand correspondents, we ought to increase considerably our membership and do good to the world.

Our rule that membership shall begin with the calendar year always gives rise to some misunderstanding. Those who come in at the time of the annual meeting,

or between it and the end of the year, do not like to pay another fee along in January. If there is no objection the secretary will hereafter inform each applicant for membership that membership expires with the calendar year, that membership may be taken out for the present or the coming year, and that membership entitles necessarily only to the publications issued during the year for which membership is taken out. In other words the proceedings of this meeting will be published in 1915 and members for 1914 will not be entitled to it unless paid up for 1915.

The investigation of the Persian walnut trees in the East is still going on but the results have not been collated.

I suggest the appointment of a committee to revise our constitution and rules. These have so far served our purpose fairly well but, in the opinion of the secretary, they now need modification and amplification.

I would recall to the attention of the members our present rule that all papers read before it are the property of the Association.

In conclusion the secretary would like to ask each member to help increase the prosperity and the usefulness of the Association by getting new members, by getting advertisements for the annual report, and by paying his annual dues promptly. It is a waste of any nut grower's time to have to dun a lot of careless people.

The President: The chair will now entertain a motion to approve the secretary's report.

Professor Smith: The Northern Nut Growers Association has been very fortunate in many things and especially in its selection of a secretary. The services he has so faithfully rendered are very much appreciated by the Association, and I move the report be accepted.

[Seconded and carried. Also moved, seconded and carried that the secretary be authorized to sell back numbers of the reports at a reduced price.]

Dr. Van Duzee: I would like to say that a most important thing has been overlooked, and that is that the chair should appoint a committee to lift the load of financing the work of the Association from the secretary's shoulders.

The President: It is very flattering to suggest that the chair is competent to appoint that committee. Do you make it in the form of a motion, Dr. Van Duzee?

Dr. Van Duzee: Yes sir, I make that as a motion.

[Seconded and carried.]

Professor Close read the following report on score cards prepared by Prof. E. R. Lake of the committee.

PROPOSED SCORE CARDS FOR JUDGING NUTS

Score-Card (Plates, Trays or Cartons)—Black Walnuts, Butternuts and Hickorynuts

General Values:	
Size	10
Form	5
Color	5
Shell Values:	
Thinness	15
Cracking	20
Kernal Values:	
Plumpness	5
Color	10
Flavor	10
Quality	20
	100

NOTE: For insect or fungous injuries deduct 5–10 points.

Score-Cards—Chestnuts

General Values:	
Size	20
Form	5
Color	10
Freedom from fuzz	10
Size of basal scar	10
Kernal Values:	
Flavor	10
Quality of kernal	25
Thinness and quality of inner skin	10
	100

NOTE: For insect or fungous injuries deduct 5–20 points.

Score-Card—Filberts

General Values:	
Size	15
Form	5
Color	5
Shell Values:	
Thinness	15
Kernal Values:	
Plumpness	10
Freedom from fibre	10
Color	5
Flavor	15
Quality	20
	100

NOTE: For insect or fungous injuries deduct 5–10 points.

Commercial Pecans

General Values:	
Size	20
Form	5
Color	5
Shell Values:	
Thinness of shell	10
Cracking quality	20
Kernal Values:	
Plumpness of kernal	20
Color of kernal	5
Quality	15
	100

Score-Card (Plates)—Persian Walnuts

General Values:	
Size	10
Form	10
Color	10
Shell Values:	
Thinness of shell	10
Smoothness of shell	5
Sealing	10
Kernal Values;	
Plumpness	5
Color	10
Flavor (sweetness, nuttyness)	10
Quality (crispness, richness)	20
	100

NOTE: For insect or fungous injuries deduct 5–15 points.

DR. MORRIS: I would say that this is a very excellent system as a basis for judging. We must at all times have in mind the idea of working to keep the quality very high. The reason for that is because the tendency has been in the other direction. Appearance has been rated very high, especially on the Pacific Coast, which is one of the centers in nut raising today. I observed, while on a trip from southern California to Washington and Oregon, that people all spoke about the beauty of the nuts, and said little of quality. They will show you great, handsome, bleached nuts, and some of the very poorest in quality are the ones about which they talk the most, and they recognize this fact among themselves. I haven't been looked upon with favor when telling them frankly that a certain walnut ought not to be put on the market at all on account of its quality. They resented that attitude on my part, but later when I was standing nearby I overheard rival walnut growers

talking to each other. One said to another, "That is a handsome walnut, but you will have to hire an awful good talker to get it on the market." They resented my criticism and my judgment but among themselves said, "You have got to have an awful good talker to get that nut on the market."

It is this matter of quality that must stand first among nuts as among men. Many know that there is no better pecan than the San Saba. That is standard for quality, yet it is not regarded as being so desirable as some of the others because of its small size. We must always keep in mind the quality rather than size and appearance. Of course, we like things that look well but that side will be taken care of incidentally in the course of the development of the subject.

Professor Smith: Dr. Morris, I should like to ask you a few questions. Is it not the same as it is in the apple and peach market? You know in that appearance counts for a great deal. Are you sufficiently acquainted with the subject to say we will be safe in growing a nut that is second class in appearance but first class in quality?

Dr. Morris: I am glad Professor Smith brought up that point. There is just one way to approach the matter. Take a fine, handsome, large English walnut, that has been bleached, and has lost quality in the process. Growers have gone to a great deal of trouble to get it on the market. Put alongside of it a small, thin-shelled, high quality walnut that has not been bleached, and tell the dealer who is to sell those two nuts that the great big handsome nut is to sell for 15 cents a pound, and the ugly little one is to bring 30 cents a pound. That will attract the attention of people to the good nuts. You can force people into having good sense, through the exercise of a bit of dexterity in applied psychology.

The President: Dr. Morris's remarks are very well taken, because nuts are to be eaten and not to be looked at. Is there any further discussion on this subject? If not, we will pass to the next.

The Secretary: The next thing on the program is the appointment of committees. The advisability of amending the constitution and rules has been already referred to. They have served our purpose pretty well up to now but we have outgrown them. In order to expedite matters and get to the real business of this Association, as this constitution is going to be amended anyway, I would like to move that the rules about the appointment of committees be suspended and that the chair be authorized to appoint the necessary committees. This includes the committees which the rules

direct shall be elected, but that takes a long time and I move that the chair appoint these different committees.

THE PRESIDENT: Do I hear a second to that motion?

A MEMBER: I second the motion.

THE PRESIDENT: It has been moved and seconded that the rules requiring that these committees be elected be suspended, and the chair be authorized to appoint the different committees. The chair holds that it will take three fourths of the members present to suspend the rules. Is there any discussion about this?

MEMBERS: We are ready for the question.

THE PRESIDENT: All in favor of the motion made by Dr. Deming, make it known by saying aye.

[Vote taken.]

THE PRESIDENT: Those opposed, by the same sign.

[None.]

THE PRESIDENT: The motion is carried that the chair appoint the different committees, and they will be announced at the proper time.

The next thing on the program is a paper by the President. I will ask Dr. Morris to take the chair while I read what I have to say.

STATUS AND POSSIBILITIES OF NUT CULTURE IN THE NORTH

T. P. LITTLEPAGE, WASHINGTON, D. C.

The purpose of the Northern Nut Growers Association is to stimulate the production of nuts in the North. We distinguish the North from the South in this regard not because we feel any less interest in the nut industry in the South. The man who once becomes a nut enthusiast is no respecter of Mason's and Dixon's Line or any other line that separates him from an interesting nut tree or from a section in which nuts may be successfully grown. His local interest, however, will naturally be around his own dooryard and neighborhood. So we speak of northern nut culture and northern nut trees because we live in the North and because this is the section of the United States that needs at the present time the most intelligent direction. The South has been forging ahead for a number of years in this field. In fact, pecan culture promises to become second only to the cotton industry in many sections of that country and interest in its possibilities has attracted to it many conscientious, able and prominent horticulturists who are today engaged in pecan

growing in the South and who are doing much to put the pecan industry on an honest and intelligent basis. These men have become specialists in the pecan industry and they know more about it than we do in the North. Consequently they do not need our assistance, even if we were able to give it, and, therefore, without any fear of our being criticised for using the adjective "northern" we can limit our investigations and discussions to nut culture in the northern part of the United States with a full knowledge that our southern brethren can take care of themselves, and, in addition, can render us much valuable assistance which assistance we most cheerfully invite.

At this point, however, in connection with the use of the terms "northern" and "southern," it may be relevant to make a few observations as to the possibilities in either section. While it is true that the South has a long start of the North in pecan culture, yet the North affords an opportunity for the cultivation of nuts which is not possible in the South. The South is today the home of the delicious varieties of pecan which are a delight to the consumer and a source of fascination and profit to the intelligent producer, but it must be remembered that the northern pecan belt has many excellent varieties that are "good enough." In addition to this, the North is the home of the black walnut, the fine shagbark hickory, the butternut, the chestnut, the hazel-nut, and the chinkapin, and is also adapted to the hardy varieties of the English and Japanese walnuts. All of the nuts just named certainly offer an ample field for our interest and enthusiasm, and, in addition to the keen delight which comes from the successful growing of these trees, there is a possibility of profit which I do not think is excelled in any horticultural undertaking today.

First then, what word of advice or instruction can the Northern Nut Growers Association bring to the prospective nut grower which will be of help? For, after all, the success or failure of this association depends largely upon its ability to help the grower or prospective grower. Before we undertake to give suggestions about the development and culture of nut orchards or to make prophecies as to possibilities, let us stop and take stock for a moment of the present status of the nut industry in the North and consider what we have to build upon and what materials we have with which to work. Mistakes have been made in the past by the prospective nut growers because they did not stop to consider the possibilities of the nuts that were native in their own locality, but looked abroad for something else. This is characteristic of many people. "Distant fields

look green," and, of all the imported nut trees, none except the English walnut have been of any success here whatever, while, in one instance at least, their importation has resulted in introducing into this country the fatal chestnut blight, which probably came in on uninspected stock from Japan. We have better native chestnuts in this country than any foreign chestnut and the blunder of trying to get something different is costing the country millions of dollars through the scourge of the chestnut blight, which threatens to wipe out the industry. It reminds me of the epitaph on the tombstone which read: "I was well and wanted to be better, took medicine and here I am." Therefore, let us consider what nuts we have worth while.

The Pecan

First, we have the northern pecan which is native in certain portions of a belt approximately 150 miles wide, with Evansville, Indiana, on the 38th parallel, as the center. I do not mean to say that the pecan will succeed in all portions of the northern half of this belt or that it may not succeed in many sections farther north. The question of climate, as modified by proximity to oceans and large bodies of water or as made more rigid by absence of these protections, may decrease or increase the latitude at which the pecan can be successfully grown. The orange, for instance, is one of the tenderest fruits and yet, on the western coast, orange groves are flourishing at the same latitude as Philadelphia, which is nearly on the 40th parallel, although it is unnecessary to say that an orange grove would not survive within four or five hundred miles of the 40th parallel any place else except on the favored western coast. The southern varieties of pecans will not flourish in the north and we do not know whether the northern varieties will flourish in the South.

The pecan is a hickory and the northern trees are very hardy and thrifty. Many varieties have been discovered the last few years which are thought to be worthy of propagating. Among them are the "Indiana" and "Busseron," from near Oaktown, Knox County, Indiana; the "Niblack," from Vincennes, Knox County, Indiana; the "Warrick," "Green River," "Major," "Kentucky," and "Posey," all from the Evansville section; the "Norton" from Clarksville, Missouri, and several other varieties.

English Walnut

The next most important nut, and probably competing very closely with the pecan for popular favor, is the English walnut,

which is perhaps the only nut that has been successfully imported for growing. Since the earliest Colonial days, seedling nuts have been brought from France, Germany and other parts of Europe and have been planted up and down the Atlantic Coast. Most of the trees from these plantings have not been able to permanently withstand climatic conditions, but, scattered here and there throughout the North and East, are individual trees of apparent hardiness which bear nuts in size and quality comparing favorably with the English walnuts we see on the market. Among the various hardy varieties of the English walnut are the "Rush" and "Nebo," from Lancaster County, Pennsylvania, introduced by Mr. J. G. Rush, the pioneer propagator in the Eastern States. Another is the "Hall" from the shores of Lake Erie, the "Pomeroy" from Lockport, N. Y., a short distance from Niagara Falls; the "Rumford" from Wilmington, Del.; the "Ridgway" from Lumberton, N. J.; the "Holden" from Hilton, N. Y.; the "Boston" from Massachusetts; the "Potomac," "Barnes" and "Weaver" from Washington, D. C.; and a number of other varieties. The location of the parent trees just named will give some idea of the probable hardiness of these varieties.

Shagbark Hickory

The thin-shelled shagbark hickory is a nut that is coming more and more into favor and is well worthy of propagation. The first shagbark recognized as a distinct variety was the "Hales," located and named by Henry Hales of Ridgwood, N. J., about 1874. This is a very large, attractive, thin-shelled nut, but has been somewhat superseded by other and superior shagbarks. Dr. Robert T. Morris of New York has been making a systematic search for several years for trees bearing shagbarks of high quality and merit, and has been very successful in bringing a number of such nuts to public attention, including the "Taylor" and "Cook." The "Swaim" from South Bend, Ind., is an excellent shagbark; the "Weiker," from Lancaster County, Pennsylvania; the "Kirtland," from New England; the "Rice," from Illinois; and another very superior and fine shagbark from northern Kentucky which was brought to public attention by R. L. McCoy of Lake, Ind.

Black Walnuts

Throughout the whole north are tens of thousands of seedling black walnuts, many of which are of excellent quality, but, so far as is known, there are but two recognized varieties, the "Thomas," introduced during the eighties and propagated to a limited extent, and another from Lamont, Mich.

Butternut

The butternut is also quite common in much of the same territory as is the black walnut and even in regions farther north, but, so far as I have knowledge, not a single variety has been named.

Japanese Walnuts

Seedlings of two species of Japanese walnuts are quite common along the Atlantic Coast and as far inland as the Mississippi River. They are also grown on the Pacific Coast to some extent, but apparently no varieties have been recognized.

Another nut which is confused with the Japanese walnut is botanically known as Juglans Mandshurica. In character of growth the tree quite resembles the Japanese species, but the nut resembles more our American butternut and sometimes they are confused. A short time ago a gentleman in New Jersey who had planted some nuts of the Japanese varieties later cut down the mature trees because he thought they were American butternuts.

Hazel-nuts

It is never safe to use the term "hazel" without explaining that it correctly applies also to the species brought from Europe and more commonly called filberts. According to the late Mr. Fuller, the Germans discriminated between hazels and filberts entirely by the shape of the husk. A nut having a husk which extended and came together beyond the end of the nut was called filbert, meaning beard. Those having shorter and more open husks, so that the nut protruded, were called hazels after the German word "hassel,"—hood, in English. It will readily be seen that once the nuts were separated from the husks, it would be impossible by their classification to determine whether they were hazels or filberts. The Americans generally accept the use of the term hazel to apply to both the American and European species.

In the early history of our country extensive and persistent efforts were made to introduce the European hazels, and no wonder, for of all nut trees this species seems to yield most readily to garden culture. They are readily capable of adapting themselves to most any kind of soil and even to rocky ledges which would be impossible to cultivate. They attain their greatest perfection in good soil and, under proper cultivation, the trees come into bearing early and the nuts mature early in the fall, well in advance of other species. The hazel, however, like the chestnut has met with a fatal disease. It is a blight which seems to exist everywhere except on the native species, which are so far immune as to show little or

none of its effects. The American hazels, however, act as host plants to the blight, which thus quickly spreads, with fatal results, to the European species. Of all the plantings which have been made during the past one hundred and fifty years, it is safe to say that there are less than half a dozen hazel orchards in the eastern states which have not succumbed. It seems quite probable that a golden opportunity is awaiting someone who is willing to go through the forests of our eastern states, especially those in lower New England, in search of individual hazels from which to propagate new varieties. Among the heavy bearing shrubs, which exist in the section referred to, it is certain that many hazels could be found well worth propagating.

Turning now from this brief history of northern nut trees, let us consider the future of the industry as viewed in the light of sound theory and actual observation. It is unnecessary to present any argument why nut trees should be planted. Nuts afford the highest grade food known to science. They are wholesome, healthful, strengthening,—in fact, without a single objectionable feature so far as I know as an article of food and, when one considers that food is the basis of human existence, no further argument is necessary to warrant interest in one of the best foods known.

Then how shall we advise the prospective grower of a nut orchard? First, let him determine what kinds of nuts thrive in his vicinity. The prospective grower in the latitude of Evansville can indulge himself to his heart's content, for he can grow successfully the pecan, English walnut, black walnut, butternut, hazel and, up to date, the chestnut. But, success in growing any of these trees depends upon proper information, proper varieties, proper soil and proper care. Suppose a man, in the Evansville latitude, for instance, desires a pecan orchard. What should he do? His quickest way, if he has wild seedling pecan trees growing on his farm, would be to have the wild trees top-worked to well-known varieties. If he has no seedling trees, then his next best plan is to purchase budded trees of good varieties from some honest nurseryman, set them not less than sixty feet apart and cultivate and care for them. Will they grow around fence corners and creek banks? Yes, if you have plenty of time to wait. They will not, however, be in a hurry, and it may be your grandchildren who will gather the nuts. But, a cultivated orchard of budded pecan trees of the right varieties ought to come into commercial bearing as soon as does an apple orchard. Mr. W. C. Reed of Vincennes reports Busserons that were

budded fourteen months ago setting as high as sixteen nuts this year. That is, the second summer after they were budded. If the trees are of the right varieties, well cultivated, in good soil, and if you care enough for them to throw some fertilizer around them, they will please you by their growth and soon become very profitable.

Now suppose one wants an orchard of English walnuts. Almost identically the same instructions hold true. If you have wild black walnut seedlings on your farm, by all means have them top-worked to fine varieties of English walnut, for the black walnut is the best root for the English walnut. If you have no seedling trees, go to some reputable nurseryman and buy known varieties of hardy English walnuts budded on hardy black walnut stocks. Set them not less than fifty feet apart and cultivate and care for them. Mr. Rush reports one of his budded Rush trees four years old bearing fifty-seven walnuts this year. I saw a Rush in Washington City the other day, two years old, carrying about a dozen walnuts; also a Hall, of the same age, carrying about the same number. Both trees were thrifty and not much over waist high, and every terminal twig had from one to two nuts on it.

If you have wild hickory trees growing on your farm, have them top-worked by the slip-bark or budding method to fine varieties of shagbarks. In the absence of wild hickories, I believe the future will prove that the next best method of starting an orchard of budded shagbark hickories is to buy them budded on hardy northern pecan stocks. The hickory is not the best stock for the pecan because it is of slower growth, and for the same reason the pecan ought to be the better stock for the hickory. But the hickory does not grow as rapidly as does the English walnut or the pecan and requires more patience.

The hazels are going to afford a great field for the nut grower, as they are native to a wide territory embracing the Middle West, the North and the East, and ought to be profitable. A few years ago I found a very fine large hazel growing on my farm in Warrick County, Indiana. I dug up some of the roots of this bush and planted them in my garden at Boonville, and in three years they were bearing fine clusters of hazels larger than those borne by the parent bush. I think farmers would find it profitable to set out hedges of native hazel bushes around their fields and fences and on hillsides.

Butternuts, black walnuts and beech-nuts also offer a fertile field for experiment. Any varieties of butternut or black walnut

can be propagated by budding or top-grafting them on seedling stocks.

I should like to suggest that every farmer in the nut growing belt set aside at least ten acres of land for a nut orchard. It will give him a new interest in life and afford him more pleasure and relief from the ordinary monotony of farm work, I believe, than any other line of work he can pursue. If Ponce de Leon had planted a nut orchard in this country instead of wasting his time searching for the fountain of perpetual youth he could have spent his old days in interesting, profitable and fascinating work instead of in despair and disappointment.

But some of the practical questions asked are, "What is the cost of a nut orchard?" and, "How soon will it bear?" and "What will it be worth when it does bear?" No man can answer these questions with any degree of certainty, for everything that man attempts has its drawbacks and disadvantages. First-class budded nut trees cost from one to two dollars apiece. The balance of the cost depends largely upon the intelligence and efficiency of the labor applied in setting and cultivating. When will they bear? That depends altogether upon who owns them. If properly cared for they will begin setting some nuts in a few years and will increase the crop as the years go by. A pecan tree ought to bear successfully for fifty years—possibly longer, and ought to be bearing nicely in eight years if properly cared for. But, success depends upon the care and intelligence with which the original selection of trees and soil is made, and upon proper cultivation. I have set an orchard of northern varieties of pecans budded from the parent trees in the Evansville section on my farm in Maryland this spring. The land cost me sixty dollars per acre. When they are ten years old they ought to be worth at least five hundred dollars per acre. I do not know how much more this grove of nut trees will be worth in ten years, but I would not option them at the present time for that price. I have about the same confidence in the English walnut.

I have always been conservative on these matters and always expect to be because in conservatism lies safety. These figures I have given you are merely my personal opinion. I have seen pecan groves ten and fifteen years old for which I would not have given any more than the land was worth on which they were growing. If any one has a notion that he can make money in nut culture, without intelligent exertion, he had better go into some other line of business in which there are men having a fair degree of success with unintelligent effort. I know of no nut grove in the whole United

States that is succeeding without intelligent application, and on the other hand I do not know of a single grove which with intelligent application is not succeeding. I am a "conservative-optimist." I have been talking nut culture for a number of years and expect to see every hope and estimate which I have expressed fulfilled, and after all has been said and considered my final advice is to *Plant Nut Trees.*

The President: The chair invites a very active discussion of this paper.

Professor Smith: It would be unkind to criticize so very instructive an address but there is one thing laid down in that paper I wish to speak about. I believe we were told we must cultivate our nut trees. I believe the fact is that in the greater portion of the United States, we can grow trees, even nut trees, without cultivation. If anybody doesn't believe that, go to Washington by the Chesapeake Railroad and you will see thousands of walnut trees along the way. I believe the human race can grow trees on a hillside without cultivation, and I want to suggest to persons putting out nut trees to put out a few in places where they don't have to be plowed, and see if they don't get good results. Cultivation is not a fundamental element of agriculture or plant life, but is the quick way to get results.

In many places in Ohio the state experimental work in horticulture, especially that carried on by F. H. Ballou, has done some wonderful things in waking up apple orchards that had not grown a quarter of an inch in years. Merely giving them food has caused them to wake up and bear. I have seen them, and know. The books say that while apples may grow without cultivation, peach trees *must* be cultivated in order to bear. I have peach trees that are three years old in a rocky piece of ground. I can't plow it but I have fed some of the peach trees and a few I did not, that is not much, and the ones that were fed as they should be are much the biggest and are bearing well. My point is this, keep the grass well scraped away to prevent trunk injury, and feed even a peach tree and it will do well. I think the same is true of the nut tree.

Whether a tree that is set out, liberally fed, and the grass kept away will do as well without cultivation, is a subject worthy of your consideration and experiment.

The President: The chair especially desires to call attention to Dr. Smith's remarks because he has made a very careful study of this question and his suggestions are worthy of very great con-

sideration. I have talked these things over with him a great deal and I commend his remarks especially to the Association for discussion.

Dr. Morris: In connection with the matter of cultivation I would also like to have Mr. Reed discuss that. I want to say, however, that, in using fertilizers, you will often very easily overdo the matter. Sometimes in my experience professionally, I give a patient medicine enough to last a week, with directions that a teaspoonful be taken twice a day, and the patient may believe if she takes the entire bottle at one dose she will be well in an hour, and consequently suffer from an over-dose. That same idea is sometimes carried out in the fertilization of trees by horticulturists. You don't intend to do it but sometimes you can kill with kindness and be too good in feeding your trees if you don't understand how much fertilization the tree needs. That is the idea, you have got to give your trees the ratio that they need. If you give them too much pie or pudding, your trees will have indigestion and will not thrive and may die. I have lost a great many good trees, and a great many nut trees, and have checked the growth of a great many by not realizing this. I wish Mr. Reed would speak to us about it.

Mr. Potter: I want to state some experience I have had and when Mr. Reed talks, I wish he would give me some information. I set out some pecan trees on my lawn in the front yard, and of course there is not much cultivation there except around the trees. It is like most other lawns in southern Illinois, mostly clay and what other soil we put on top. Now the clay is very hard and in setting the trees I had my man dig a hole three feet deep and two feet across and in setting the trees I packed good dirt around them. The question is how should I feed those trees? I have put barn manure around them and they are now growing and doing very nicely. I want to know if I have pursued the right course.

Mr. McCoy: I believe this question of growing trees in fence corners and on hillsides is not so large a question. The main thing is to give them plenty of water. There is very little land in the Mississippi valley that won't grow pecan trees or most any other kind, if you will give them sufficient mulch and plenty of water, because they take their food in the form of soup. Unless they have water, they won't grow. I believe the best cultivation you can give a tree of any kind is a good mulch of straw and manure. You that have had experience in this part of the country know that is the best way to cultivate trees.

I grew a peach orchard once in one year, but I have quit that, I

have learned better. It is simply a question of water and plant food. If you will mulch any kind of a tree, nut tree or any kind, with ten or fifteen inches of straw and stable manure, you will have a steady growth from early spring until late in the fall, and it will make a strong tree.

Professor Smith: While we are waiting for Mr. Reed I want to take up Mr. McCoy's soup suggestion. Water doesn't make good soup without something in it. Experiments show that you can mulch ground in some places and not wake up the tree, but fertilizer will wake it up the first year.

Mr. Potter: What kind of fertilizer did you use?

Professor Smith: One must experiment to see what his land is short on. Sometimes you can fertilize your trees without any result. Sometimes potash will not do any good and sometimes it will. You will have to see what your ground needs. For young apple trees I found in my particular situation that nitrate of soda is all I want. I have what is called a Porter's clay soil on the Blue Ridge Mountains of Virginia. I use that and then my trees get busy and grow. They make rapid growth even the first season with a handful of nitrate and for my three year old trees half a pound is enough. That is what my soil seems to need and we must use what the soil is short on. That is my interpretation of my situation and it works.

The President: Who can tell us whether nitrate of soda is good for nut trees? Can you, Mr. Simpson?

Mr. Simpson: In the South, we do not think so.

The President: The reason I asked, is that I have been studying that. I wrote Mr. Potter a letter suggesting that he use some on his young nut trees to see what it would do, and later I found out that all through the South it was not regarded as desirable. It seems they claim it starts pecan trees into an active growth but when they stop they make a very sudden stop and don't start growing any more. I want to get this in the record right here. You understand that is the general belief throughout the South, do you not?

Mr. Simpson: Yes sir, it is not considered good.

The President: Dr. Smith has made a very careful study of fruit trees and knows its effect on them from experiments, but it is well perhaps to consider fruit and nut trees separately.

Professor Smith: I should suggest to anybody who is thinking of working with trees, to get some seedling pecans and plant them and then fertilize some of them and others not, in the same

kind of soil. In that way he can get his own fertilizer conclusions at a small expense and then he will know what his own soil needs.

Mr. McCoy: We fertilized seedling pecans in a clay soil and we decided the trees we did not fertilize got along better than the ones we did. Of course that ground is better where the trees are than on the average farm. We used nitrate of soda and potash but we decided the ones we didn't fertilize did the best.

Mr. Potter: I put two pounds of nitrate of soda around each tree and the English walnuts I used it on budded out very shortly after using it, but along about June they died. The pecan trees we used it around grew fairly well, but some of them, one in particular, appeared to remain dormant, almost, until about two months ago when it commenced growing and is now growing very rapidly. So you see I don't know where I am at.

The President: In writing you I did not understand the size of the tree. On some trees I have been using a tablespoonful, about that, and I was afraid I got too much.

Mr. Potter: Evidently I got too much.

The President: Evidently we got mixed up on the quantity. I know I never used more than two tablespoonfuls at any time and I should imagine two pounds would be a big overdose. I remember talking to Dr. Smith about that time about some old apple trees around which you can use five or six pounds of nitrate of soda and I suppose that is the way we got mixed up. I must have had that in mind as I did not intend to advise that amount for young nut trees.

Mr. Pomeroy: How long a season should the tree keep growing? From early spring to late in the fall? My experience is they will stop about the first of August, and let the wood ripen up and harden for the cold weather. Some might keep the trees growing longer, but you will hurt the trees I think.

The President: We have not heard from Mr. Reed yet.

Mr. C. A. Reed: I am glad the discussion has proceeded as it has since it has given me time to reconnoitre. I hardly know what to say on this subject that Professor Smith has brought up. I guess he knows what he is talking about so far as his experiments have taught him. The department does not like to discourage a good thing nor to encourage a thing that is too risky. There is one thing quite sure and that is that so long as nut trees are selling for from one dollar to two dollars apiece, very few people are going to buy them and plant many of them on these hillsides and experiment with them. People cannot afford to do that. We have found,

taking the country over, that nut trees thrive best when they are given treatment; that is they must be given cultivation and fertilization; be given some degree of attention the same as an apple or peach orchard. Colonel Sober, however, will show you quite a different thing. He will show you chestnut trees that are not cultivated at all, so there is a staggering blow to my argument, and yet Colonel Sober gets something like three and a half bushels to the tree. You don't fertilize those trees, do you, Colonel Sober?

Colonel Sober: No sir, not at all. Haven't yet.

Mr. Reed: So there is an argument that silences me and still it is true that we can't safely plant hickories and pecans without some degree of cultivation. I don't think Professor Smith has planted any on these hills.

Still we all agree with Professor Smith in a way. Something ought to be done to the surface to prevent the land from washing, and there is no better way of doing that than by planting trees. Then the roots will prevent washing and they can take care of themselves better than a surface crop. Especially is this true on the hillsides, so there is a good deal in Professor Smith's argument. And yet there is the danger that those trees will be infected with disease and insects. On plants and trees that are attended to and cultivated we find those pests will be kept in check. So there are two sides to that argument.

Professor Smith: The point I raised was this, that it is possible in some places to attain by fertilization the advantage that comes by cultivation in other places. Great things have been done without fertilization. There are chestnut orchards in Corsica of grafted trees, ranging from the size of my wrist to eighteen to twenty feet in circumference. They have not been fertilized in centuries, and they yield enough to support the entire population.

The President: We would like to hear from Col. Van Duzee, and I want to say that, as President of the National Nut Growers Association, he is well acquainted with these things. I commend him to you and promise that whatever he may have to say to you is worthy of your very careful consideration. I have the honor to belong to the association of which he is the president, and know it is seldom we have an opportunity to hear men like him.

Col. Van Duzee: Gentlemen, I am going to side step this argument for I do not think it worth while taking up the time. We are here for other purposes. Personal experiences are not the general rule because each one's experience differs from that of others. We might all tell our personal experiences and after we were all

through we would not have accomplished anything. I want to take you back to the point from which we started this, in order to know what we are talking about. To illustrate what I want to say to you, we can take the root pasture of a tree and analyze it in every possible way so as to bring to bear upon it the best judgment we have from all sources. The tree grown upon a hillside has a root pasture which is entirely different in many ways from the root pasture in the river bottoms. If we have a tree growing on a hillside in a soil that easily transmits moisture and it gives that tree constantly a stream of pure water going through its root system, and there happens to be enough fertility in that vicinity, that moisture is impregnated with plant food, and the tree will get all it wants. You can't speak in the same breath of the tree growing in the river bottoms whose entire root pasture is entirely different. The root pasture may become contaminated by various things which may cause, so to speak, ptomaine poison. Therefore I say that every locality, every soil, every climatic condition, every variety of tree must be taken as individual. What would be good for an apple orchard in Virginia might be fatal to an apple orchard immediately south of Lake Erie in Ohio. The use of commercial fertilizer that would be good in one locality would be bad in another. Therefore I disapprove of this kind of a discussion, because we are not speaking to a definite point. I want to bring your minds to this point, that every individual tree and its locality, and the man that is responsible for its welfare, must be analyzed before you can speak intelligently about what must be done.

I am going to tell you the same story I told the societies at Pharoa, Alabama. They wanted me to talk on this subject and I said, "You remind me of a backwoods character I have come in contact with in the woods of Florida who is ill and doesn't know what is the matter with him. He knows he needs medicine and he goes down to the general store and buys a bottle of patent medicine recommended by the groceryman and he takes it and maybe it helps him and maybe it don't, but if he don't get better he goes and gets advice from some other man like the grocer." I said, "That is the way you are demonstrating fertilizer." The first thing I would advise would be this: to analyze the individual pasture of the individual tree and take everything that enters into the history of that tree and everything that bears upon it. All the accumulated wisdom of others won't help us very much. We have to use common horse sense. We can't talk about these things gen-

erally. In poor soil and under bad conditions the pecan tree will do nothing. There are trees I know twenty-six or twenty-seven years old that are not as large as my wrist, that have never borne a nut and never will. I can also show you trees in that immediate vicinity, planted at the same time from the same nuts with favorable conditions, that are seventy or eighty feet high and bearing good crops of nuts. Those nuts came out of the same bag the same day, and were planted by the same man in the same locality, and that proves, as I have said before, that you cannot discuss things of this kind in general terms and it is a waste of the time of the association to do so. I would be glad to answer definite questions as to definite points.

The President. The next will be a talk by Dr. R. T. Morris of New York.

Dr. Morris: Mr. Chairman, and Members of the Association: My subject relates to personal experiences with hybridization work. This is work which is to be done more and more by various members of our association, and we are thus to create new species of trees. Nature's whole endeavor is to preserve the mean type among races of organisms. There are mutants among all trees, among the hickories and walnuts, as well as among the peaches and pears. In fact all species undergo mutation. We select the most desirable mutants and we try to fix a given type by grafting and propagating. Seedlings will go back toward the mean type. The mean type hickory, walnut or chestnut is the type that nature wishes to preserve, but these are not best for man's purposes. What is best in nature's plan is not always best in man's plan. We have got to dynamite nature. We have got to put a charge of dynamite under nature's seat and blow her up, in order to get what we want for our own purposes. How do we do it? How do we break up the mean type of a variety or species? By crossing the flowers and bringing together the parents we wish to unite in the hope of growing new forms, among which will be some that are particularly desirable for our purposes.

Now in doing this work, I have had to get by experience a number of points which will be of value to members of this association. First, in regard to collecting pollen. Sometimes species, which we wish to cross, flower at widely different times. They bloom perhaps two or three or four or even six weeks apart, and it is a question how long we can keep the pollen viable. What can we do about it? There are two good ways. First, get your branches of male flowers before they are open, put them in cold storage, or in an ice house, or

in a dark room, and keep them anywhere from one to six weeks dormant. When you want to use them, and your trees of the pistillate flowers are ready, take the branches of staminate flowers out of the ice house and put them in jars of water in a warm room in the sunshine. They will blossom and make good pollen shortly. Another way is through correspondents living at a distance. These correspondents will send you pollen from a species which blossoms later further north or earlier further south, at the time which you wish for your pistillate flowers. For instance, in crossing chinkapins with oaks, the chinkapins will blossom about the 12th of June in Connecticut but most of the oaks are through blossoming by the 12th of May. There we have a month's difference. How can I use oak pollen upon my chinkapin trees? I do this bysending away up to the northern limits of the growth of the oak tree, up in Canada. The red oak tree blossoms there in June, the same species that blossoms with me early in May. Pecan pollen that I wish to use upon shagbarks and walnuts I get from Texas. Now how are we to keep pollen when we have collected it, if we are not ready to use it immediately? I have had pollen sent to me from a distance in tightly corked bottles. It was probably ruined at the end of three or four days, because it could not breathe. Every grain of pollen has to breathe just as surely as a red squirrel in the top of a tree has to breathe. The pollen grain is a living organism, and if it is sent in a closely corked bottle it smothers and dies. You must have it sent in paper or wooden boxes in order to have it in good condition when it arrives, and it must be kept in a cool place, not too dry and not too damp. If it is kept in a place that is too damp, various fungi appear, and begin to attack it at once. If it is too dry, it loses its water content, and its protoplasm does not make combination with that of the other flower. So we must keep our pollen in a cool place, not too dry, not too warm and not too moist, and where it can breathe. We may put it in cold storage but not at a temperature below freezing. We may put it into the cold storage which florists use, and keep it for a long while. Some pollen will keep viable for three weeks, under these conditions, possibly longer. It is important to keep your pollen boxes open at the top. They must be kept where the wind doesn't blow your pollen from one box to another. I had not been impressed by that point until this year. I had eight different kinds of pollen about the farm house, in different rooms, in order to be sure to keep them far apart. One day on my arrival from town ready for pollenating a number of trees, I found that a very neat housekeeper had found it undesir-

able to keep such boxes scattered about in so many places. She had put them all neatly together in a closet on one shelf, and there was none of the pollen that I could use, because the wind had mixed the kinds all up. I had eight kinds of pollen across which one kind of wind had blown.

There is one practical point in cross pollenizing flowers that I have recently learned. Pollen of one variety may not combine with the ovule of another variety or species but may stimulate the ovule to go on and develop all alone, without taking to itself the added pollen. That is a very important point, and possibly a new point. I was deceived, and reported that I had crosses of certain trees, and that such hybrids were growing. I knew that the flowers of parent trees had been properly protected from their own pollen. Now when these young trees are two years of age, I find they are true to one parent type; so true that they are evidently not hybrids. They have developed from the pistillate parent only. In ordinary parthenogenesis the fruit grows without any pollen influence at all. This forced parthenogenesis whichI have described seems to be a phenomenon with which botanists are unfamiliar. Until I learn that it has been described and named by others I shall call it Allergic Parthenogenesis (Allos, ergon). The pistillate flowers accept absolutely no pollen, but go on and develop because of its impulse given. In cross pollenizing flowers, I find one point of great practical consequence. When covering the female flowers with paper bags to protect them from their own pollen you give protection to a great number of insects. The insects remain inside these bags and destroy the leaves and flowers. They are protected there from their enemies, predatory insects and the birds. When the bags are taken off, perhaps a week later, for the purpose of adding pollen to pistillate flowers, insects may have destroyed the leaves and even the flowers. Consequently, I find it best to sprinkle the leaves with Persian insect powder and to put some of it in the bags that are to cover the flowers. Insects can't live in an atmosphere of this insect powder. They sneeze themselves to death. I have taken the bags from leaves and flowers which were so badly injured by insects you could distinguish them at a considerable distance. These are all the points that I jotted down for this address today, but no doubt many other points will be brought out in the subsequent discussion.

Mr. McCoy: I would like to inquire how far it is possible under a microscopic examination to determine the species of the pollen.

Dr. Morris: It is possible to determine the species but not

the variety so far as I know. It may be possible to determine a variety but I don't know the extent to which that is possible, from microscopic examination of the pollen. If we wish to know whether pollen is still good or not we may in twenty-four or forty-eight hours cause it to "sprout," and in that way know whether it is viable and good. We may save ourselves a good deal of trouble by making this examination and determining whether or not a given lot of pollen is viable before putting it on the flowers. We can cause it to sprout in a sugar solution.

THE SECRETARY: What is the strength of the sugar solution?

DR. MORRIS: That is technical work and must be done by a plant physiologist. He will do it for us at the State Agricultural College and telegraph his report.

MR. DORR: Is this work you have outlined of sufficient definiteness to get results? That is the important thing. We farmers sometimes discover a plan accidentally that will outclass anything we can get in an agricultural college.

DR. MORRIS: That is very important. We are to produce nuts that are better, and also in greater quantities. The question if hybridizing work is valuable has been already answered in the case of roses and soft fruits. Our best types are largely the ones which have been secured by hybridization and the same will be true of nuts. The subject has not been so largely taken up as yet with nuts. Very few of us are doing with nuts what has been done with other fruits.

THE PRESIDENT: The chair wishes to say that the members of this association have a very great and rare opportunity to secure information on this subject. Dr. Morris has made a very careful study of it.

DR. MORRIS: The more study I make, the less I seem to know. Consequently I shall be very modest in my replies.

MR. DORR: I have been working with different things and find so many things I can't get at the truth. In the last year I have made experiments in breeding cattle to get colors, and I was agreeably surprised with my own success. I want to know if you can get similar results. I can observe the results so readily that I know exactly how I get them.

DR. MORRIS: As a general statement the same thing you get from working with animals we may expect to get in working with plants. The protoplasm of plants is now known to act like that of animals, but not quite so quickly or freely in response to cultural methods. We can breed to size and breed to quality and character

of fruit, and we find we may do with plants just about what we do with animals, only not quite so quickly, because animal protoplasm responds more readily.

Mr. W. C. Reed: I would like to ask if in a cross between the Persian walnut and the shagbark hickory there is a cross pollenization, or is it an increased vitality given by the pollen? Is there really a cross there?

Dr. Morris: I made one cross between the Persian walnut and the shagbark hickory that was evidently a good hybrid, It showed character of both parents, but I lost that entire lot. I wasn't careful enough in protecting them. I have another lot of crosses between these two flowers in which the type often is so definitely shagbark hickory that I doubt if there is any walnut there at all. Under certain conditions we may get hybrids, yet miss it at another time, even when working with the same parents. Somebody has probably made a better study of this point and recorded better ideas. I think we may safely say that we may expect an actual cross between some walnuts and hickories.

Mr. McCoy: Would it be possible to cross the English walnut and the black walnut and produce a nut of superior quality?

Dr. Morris: Yes, it is possible to cross them, but you do not often get a nut of superior quality. The tendency seems to be to have a nut of thick shell and of not high quality, but if you make a thousand of those crosses, out of the thousand you may get a few of just what you want.

Professor Close: I want to ask if you are always careful to apply the pollen when it is well ripened?

Dr. Morris: Yes, I have always been careful to apply it at just the time when it was well ripened, and that is of great importance in its bearing upon Mr. Reed's question. If I have pollen which is quite ripe I may perhaps catch it upon an ovule, but if it is not ripe I won't get the cross. I may add it a little too early or too late when the pistillate flower is unprepared and I won't get a cross. If I get my pollen just at the right time upon the pistillate flowers I may have a good cross, between varieties which do not cross readily.

Professor Close: In my experience in breeding apples, formerly I always waited until the pollen was ripe, and that meant I had to cover the blossoms with bags and depend on the weather for conditions favorable to pollenation. But four or five years ago I began pollenating much earlier and I have had good results.

Dr. Morris: That is a very important point.

Professor Close: By doing that I know it is pollenated. I

have been failing so many years I felt it was a loss of all the first part of the work.

Dr. Morris: It is a great convenience to be able to pollenate at the same moment when you emasculate.

A Member: I would like to have you kindly explain to what extent cross pollenation can be made practical to the ordinary grower.

Dr. Morris: Let's say that in case of the butternut we wish to experiment with removal of the thick shell, and also to obtain less of that strong oily flavor; we wish to get rid of those two things. In order to do that I would first think of the Japanese walnut, *juglans cordiformis,* which has a much thinner shell and is less oily and more bland. Crosses between this Japanese walnut and the butternut we may fairly expect will sometimes give us a large, thin shelled butternut of good character. The next question is, who is going to do it? The men about my place are pretty busy and this is rather delicate work. It is going to be a most inspiring field for the young folks and the ladies, because it is nice, pretty, ladylike work, and beside that its returns may be large. If your little daughter, ten years of age, knows that she may get $2,000 for a single cross that she has made, it is stimulating, because it is not every child ten years of age who can put $2,000 in the bank, as personal earnings of increment.

Mr. Mosely: I would like to ask just what results you expect from the cross pollenization of these nuts, and just how far they will differ from the parent type?

Dr. Morris: You are bound to have continuance of one parent type, but in crossing with pollen from hybrids you may carry desirable characteristics through a series of generations and breed for what is wanted, possibly to the sixth generation or even further with some species.

Mr. Mosely: Then the type is not fixed until pollenization?

Dr. Morris: By selecting the one showing the dominant characteristics you wish to preserve, you could breed through several generations and have an ideal type eventually.

Mr. Doan: I would like to ask how far the buds are developed in cold storage before the pollen can be used?

Dr. Morris: For instance, take the hazel when its catkins are just beginning to elongate. It may be put in the ice house and kept there, for two or three weeks dormant. When we wish to develop those flowers we put the branches in a jar of water in a warm room and in about three days the plants are shedding pollen. I got some hazel catkins this spring that were elongating. It was the latter

part of February when we had one or two warm days and I believed my pistillate hazels were about ready for pollen. I got those branches from Rochester. We had unexpected cold weather and storms and my pistillate hazels did not bloom until more than two weeks later. I kept these undeveloped catkins that I had received, in a cold dark place. When I wanted to use them I put them in a jar of water and in less than three days they were shedding pollen freely, at a time when my pistillate flowers were ready for pollen.

Mr. Mosely: I would like to know the object in crossing the oak on the chinkapin.

Dr. Morris: My idea is to get a chinkapin tree twice as large as an oak, perhaps. I shall hope to have a chinkapin tree as sturdy as the red oak, with nuts larger than acorns and of as good quality as the chinkapin nut. Of course that extravagant possibility only appeals to one with a speculative nature.

The President: Pursuant to the authority conferred on the President this morning, the following committees are announced:

On Nomination—Robert T. Morris, Chairman; C. P. Close, J. L. Doan, R. T. Olcott, C. A. Reed.

Exhibits—Prof. C. P. Close, Chairman, J. F. Wilkinson, E. A. Riehl, Colonel Sober, W. C. Reed.

Resolutions—W. O. Potter, Chairman, H. R. Weber, J. Russell Smith.

The chair also wishes to place an additional member on the membership committee, in the place of Mr. Corsan, who has not been able to attend the last two meetings, and will appoint Leon D. Batchellor of Utah.

Committee on Revision of Constitution and Rules—Prof. C. P. Close, Dr. W. C. Deming.

I will also add to the committee on nomenclature C. A. Reed and R. L. McCoy.

The President: We have a few minutes before time for adjournment and Mr. Evans, a dynamite man, will speak to us.

Mr. Evans: Mr. Chairman: The question arises as to what kind of dynamite to use in the different soils. Most pecan land contains clay and can best be worked by dynamite. Don't buy ordinary dynamite, because it is too high an explosive. For several reasons it is not the kind of an explosive you wish. In some places dynamite can hardly be put on the market as many people are afraid of it and so the word dynamite has been eliminated, and we now have what we call Red Cross Farm Powder. It will work in any part of the country, it is not a high explosive and the price is lower

as the hardware dealers have it direct from the Dupont companies. By using this Red Cross Farm Powder, less labor is required and it doesn't cost very much. For labor and all it will cost you about five cents per hole, and that includes the dynamite caps, fuse and labor.

PROFESSOR SMITH: How much do you use?

MR. EVANS: That depends on the soil and also on the depth to which you want to shoot the hole. Nurserymen have different opinions on that subject, but in the southern field where I have been working they usually go from two and a half to three feet deep. They use one-half stick 20 per cent dynamite, or one quarter of a pound as it weighs two sticks to the pound. That should make a hole two and a half or three feet deep. Fuse is cheap and you should use plenty of it. A man has to be governed always by the kind of soil he is dealing with.

MR. POMEROY: In shooting an old apple orchard how deep would you go?

MR. EVANS: Where I have been working from three and a half to four feet, but as I said before it will depend largely on the soil.

MR. POMEROY: How far from the body of the tree?

MR. EVANS: I have never made a study of that.

MR. POTTER: In limestone soil, for instance, built up with clay, how near the trees would you use the dynamite if you want to loosen up the soil?

MR. EVANS: What kind of trees?

MR. POTTER: Pecan.

MR. EVANS: About six feet. I think that is close enough.

MR. POTTER: Would you make more than one hole around the tree?

MR. EVANS: Use your own judgment about that.

MR. POTTER: How far out will it loosen or break up the ground?

MR. EVANS: Probably six feet. You can distinguish on the top of the ground where it takes place.

MR. POTTER: How deep will it be?

MR. EVANS: About a foot deeper than the charge is placed.

THE SECRETARY: With me the most important thing in using dynamite is the question of headache. I used the 20 per cent at first and it had no effect. I had heard of its causing headaches and knew some people couldn't use it but I thought I was immune. Then I began to use 70 or 80 per cent and I got knocked out for twenty-four hours, The more I used it the more susceptible I became. When I went back to handling the lower percentages I got

the same results, was completely knocked out and had to go to bed Sometimes the effect would come on a long time after I used the dynamite, perhaps hours afterwards, and the headache would increase, until I was intensely nauseated and had to give up entirely. Is there anything to prevent that? Is it caused by the fumes after the explosion?

MR. EVANS: Some say it is from handling the dynamite, others say it is the fumes after the explosion. Red Cross has ammonia in it and that ought to help some. Dynamite contains nitro glycerine and if you handle it bare handed it gets in the pores of the skin and causes rapid heart action. In dynamiting holes for tree planting you will get the fumes and you will get a headache. If a man could work with gloves on he could avoid this to a very great extent. You can't do it easily but if you can do it without taking off the gloves I don't think it would bother you much. I neglected to state that dynamite by itself is not dangerous because it will withstand shock or fire or anything like that. The danger is in the cap. It contains the most powerful explosive known. It you handle them carefully, there is absolutely no danger. This year we are slipping little copper disks into the caps with a pin hole for the fire to strike through.

MR. HARGIS: I have difficulty in making the shots. Should you put your cap at the bottom or the top of the stick?

MR. EVANS: I should advise the top. A misfire is always expensive. If you think it is necessary put in a cap in the bottom and one in the top.

MR. POMEROY: If you have a misfire and the men don't like to monkey around it, and neither do you, just step off a few inches and stick in another one and let her go. Will that fix the stick that didn't go off?

MR. EVANS: That is the safest way.

MR. HARGIS: In tamping say you have a hole in a rock four feet. I have had men tell me to pour the hole full of water. Is that right?

MR. EVANS: That is the best method known.

In tree planting you will always have to use your own judgment. Go down four or five or six feet to learn the character of the soil, tamp the cartridge well and as fuse is not expensive, always use plenty of it.

THE PRESIDENT: Any further discussion of this, or any further questions on the use of dynamite?

MR. DOAN: Mr. President, I would like to mention a method I found helpful. That is to make two holes in the cartridge, one

diagonally down from one side, thrusting the fuse bearing the cap through that, and then making a hole diagonally in the other side and thrusting the cap in it.

MR. EVANS: We do not advocate using that method because dynamite will become ignited from the fuse and will burn. To be frank with you that is the method we use, but the company does not approve of it and we should not use it. You are liable to have a misfire. In warm weather there is no danger but in cold weather don't use it. The best method is to bore right in at an angle of forty-five degrees.

MR. POTTER: Do you advise us to use dynamite?

MR. EVANS: Yes, we have men making a business of it.

MR. POTTER: To be frank with you I don't like to use it.

MR. EVANS: Dynamite is not dangerous. It is the caps, though they look safe. It is that white stuff in the dynamite cap. There is where the danger is.

THE PRESIDENT: We will stand adjourned until 1 o'clock.

Re-convened at 1 P. M.

THE PRESIDENT: I will ask W. C. Reed to state something of his program for Saturday so the members may know about it.

W. C. REED: Our plans for Saturday morning are that we are leaving Evansville at 7:30, arriving in Vincennes at 9:30; several automobiles will be in waiting there to take all the party out to the nurseries and get back to the station for the 2 o'clock train going north to Oaktown, where there will be automobiles in waiting to take us out to see the original Busseron and Indiana trees, coming back to Oaktown in time for the 6:40 train south, arriving in Vincennes at 7:07, or the train north out of Oaktown to Terre Haute, to connect for Pittsburgh over the Pennsylvania Lines or Big Four if anyone wants to go that way. We would like to have everyone go with us Saturday, if possible, and would also like to know sometime this afternoon before we adjourn how many are going, so I can notify them tonight how many automobiles there will be needed at each point.

THE PRESIDENT: That is rather an important visit for the members to make for two or three reasons. Those of you who haven't had the opportunity of seeing the pecan propagated in Mr. McCoy's nursery will get a chance to see Mr. Reed's nursery; and you will get to see the parent trees of two good northern varieties. We know very much depends on the location of the original parent tree, notwithstanding it is sometimes said it is the location of the nursery

that determines the hardiness. We know that has nothing to do with it. You cannot, by putting a tree in a nursery for six months, change its nature. If you take this trip Saturday, you will have a chance to see the Busseron and the Indiana.

Mr. Reed: We will also visit the Niblack tree if we have time.

The President: I would suggest that all go who can. I want also to urge all of you to make the trip tomorrow and see the big seedling pecan trees bearing nuts hanging almost to the ground. You cannot always see that because usually they are so tall. I also want to call your attention to the exhibits in the other room. Mr. Wilkinson has a very fine collection in there. Col. Sober has some very fine exhibits of chestnuts, both of burrs and nuts, and Mr. W. C. Reed has a very fine collection and possibly there are many others I should mention. You ought to examine all of them, because the only way of drawing correct conclusions about these things comes from careful study, and it cannot be done hastily. The next on the program this afternoon will be Mr. McCoy's talk.

Mr. McCoy: I have no set speech to make. I thought maybe there were some things I might say to be a help to some of you; some things that would have been lots of help to me a year or two ago from some one, because nut trees are more difficult than any other nursery stock to propagate, and for another reason it is more difficult in the North than in the South. Mr. Paul White and Mr. Ford Wilkinson have both worked in the North and in the South, and after coming back home these boys say that anybody can propagate pecans in the South, but with us it is different. We have kept at it, though, and our president has been our good friend and has always helped us out. There have been three of us incessantly at the work. Mr. Littlepage would come down home and get us together and ginger us up, and we would go back and go to work and try again. It has been one continuous line of failures, but every year we have learned some things, or at least learned how not to do it. This spring we were fortunate in having an expert from the South who came to my nursery and stayed there until midsummer, and we saw our own work compared with his. We all had great respect for him and he is able, too. I don't think he had much respect for us when he got here but he had a whole lot when he went away for he made a miserable failure like the rest of us. Mr. Jones, you know, is an authority on grafting. He is the man that introduced it to the nut world, at least in the East. I think it had been tried in California before. We have tried his methods and everything else that government experts or any other expert told us about, and we have read all the

magazines that were published from the South to the North. Everything seemed to be a failure and finally I got disgusted and said "We will do it to suit ourselves." After we had tried all the hard ways in Christendom I think we have at last found an easy way to do it. Like everything else it is easy when you know how. I believe it is a fact—and I am saying nothing but what I believe—I don't believe you will ever successfully graft pecan trees in the North, unless you equalize your sap flow by pruning your roots. I tried it and failed. It is possible you may be able to side graft under most favorable conditions. You may make a side graft take if you leave the top on to take care of the extra sap flow. You take off the top of a pecan tree, or any other nut tree in this country, and you ruin your root system because your sap comes with such vengeance—and it comes! One day there is no show of sap and the next day it comes with vengeance. Differences in the soil, of course, makes some difference. At Mr. Littlepage's place, Paul had the sap a week before I did and Mr. Wilkinson had it four days before. A great many of our top works are going to the bad because we ruined the root system when we cut the tree. And I want to say it again, I don't believe we can make a success of it in the North. You may do it in Oregon where you have a distributed sap flow. The Oregon fellows say you can't bud, because they don't know how. They say the only way you can produce trees is to graft. That may be true out there but you can't graft in Indiana, I know, especially on my place. Of course the soil of each particular farm has something to do with it. To illustrate my point, the first year I was in the state of Wisconsin, on the 20th of June, I was out in the country and saw a man setting tobacco. I knew him and I said, "Won't that tobacco get frost bit?" and he said, "I reckon not. It might but it never did." I thought it would, but I went that way in two weeks again and I changed my mind. I had been used to seeing tobacco growing in the Ohio valley where it does its growing in the latter part of the season. In the South the sap flow is much better distributed than it is in the North.

Now, then, I have brought a board along with these young trees stuck in it, because I thought some of the members would like to see a demonstration. The tools I have here are not adequate, hardly, for the job. For a tree that size we take a saw to it.

(Here Mr. McCoy makes a demonstration of cleft grafting.)

Mr. Potter: Would you have a scion as long as that in actual work?

Mr. McCoy: Many of them are, but it would be better smaller, probably. That is a matter I don't think there is much to, whether the scion has one bud or ten. I think three is perhaps about right.

Mr. Potter: They come together right there?

Mr. McCoy: Exactly on the front side. Now you understand this grafting is done when the sap is flowing, or about the time the sap flows begins. Usually at our latitude here you will commence grafting anywhere from the 6th of April to about that time in May. Of course when you are cutting trees at that time you have got an immense flow of sap. Mr. Jones tried this method without drainage, that is the way they do out in Louisiana, but he only got ten per cent to stick, so we had to work out a drainage for ourselves. Take a piece of heavy wrapping paper, rather good quality such as you can get at any paper store, and put it right over your graft, and a little bit below the cut on your stock. Then simply take a piece of raffia and wrap. Then make the ordinary tie that anyone knows how to make with the cotton or twine, or sometimes with the raffia, and you have the drainage of this paper. The tie, of course, is simply to re-enforce the strain on the graft and hold it. Then you apply the grafting wax. The one we use is three of resin, one of beeswax, and lampblack and a little bit of linseed oil. Cover up the graft entirely, except don't cover over the lower end of this paper because there is the drainage where the sap flows out. Then you put an ordinary paper sack right over it, and leave it on for about three weeks.

A Member: You don't tie the paper below the raffia?

Mr. McCoy: That does not make any difference.

A Member: At what time do you cut a hole in the bag to give it air, or do you do that?

Mr. McCoy: Not for two or three weeks.

(Mr. McCoy now gives a demonstration in budding.)

We will suppose this is a seedling and I want to bud it. I place my budder on like that. Now I have got my shield up. Now I lay my budder on the stock something like that.

Mr. Smith: Why not wrap over the bud?

McCoy: Because it will injure it. It is essential to cove a the cut surface you can. Make it waterproof at the top, and av it open at the bottom.

Mr. Potter: How long does that stay on the bud?

Mr. McCoy: I don't know as that makes any difference unless you want to force the bud.

Mr. McElderry: When do you take that off?

MR. MCCOY: I don't know as that makes any difference. I have thousands of them that have been on five or six weeks. I take it off when action begins. It varies, it may be two weeks and it may be six and it might be six months. If you have maximum budding conditions generally the tree itself will tell the story. We frequently take it off and have to rewrap.

MR. W. C. REED: Would ten days be too quick?

MR. MCCOY: In most cases, yes.

MR. REED: Fruit trees is two weeks, but pecan trees are not quite as quick?

MR. MCCOY: Pecan trees will come through the rye about as quick as a peach tree.

MR. REED: I am talking about cherry trees.

MR. MCCOY: I think about twenty or twenty-five days is about right. You know as well as I do that cases are not all alike, and you have to know when to unwrap.

PROFESSOR CLOSE: How can you tell this if the bud is covered up?

MR. MCCOY: You can tell easy enough if the bud is alive, just like anything else.

MR. MOSELY: You say you can't graft pecan trees here?

MR. MCCOY: I don't think so.

MR. WEBBER: What do you graft?

MR. POTTER: And what will you do about the nut trees?

MR. MCCOY: I will bud.

MR. WEBBER: What value is the grafting to us?

MR. MCCOY: You may be able to graft.

MR. W. C. REED: We *can* graft.

MR. MCCOY: Maybe you can, but I can't.

I don't think root grafting is a success, although we have some fine trees that are root grafted. I don't know what it is but there is something wrong; some of them are all right, to be sure but I don't find it a general success. Of the two methods, grafting and budding, I will bud.

MR. HARGIS: Mr. McCoy, I have a number of seedling pecan trees in good healthy condition and I want to transform them into good bearing trees. What shall I do?

MR. MCCOY: Mr. Littlepage will cover that.

THE PRESIDENT: I don't know about that, whether I can or not, but that will come later. There is one thing that ought to be covered, or demonstrated here, and that is the method of working the hickory and the pecan by the slip bark method. I think the

slip bark method in the hickory and pecan is a method that everybody ought to know, and also this ought to be used with the walnut tree. Some of the walnuts ought to be top worked to English walnuts in the North. And it's the same way with the hickory through this section. There are thousands and tens of thousands that ought to be top worked to fine shagbarks, and I am going to call on Mr. White who is the most successful man in this topwork method I have ever seen. I top worked twenty-six this spring, and got twenty-three to grow; he did twenty-two and made twenty-one grow, so that record beats mine. I will say also to those of you who are interested, get a copy of Mr. Olcott's *Nut Journal* and you will see a lot of good cuts showing the results of top working. To those of you who do not know Mr. White I will say that he is associated with me in some tree work and I think he is perhaps one of the most successful top workers I have ever seen. Paul, you will now give us your demonstration.

(Paul White now gives demonstration of top working.)

Mr. Riehl: I would like to say a few things right here. I don't want to be thought altogether idle. I live in Illinois, your neighboring state. I have learned lots of good things here and I want to give a little. I have been experimenting in the nut business for some time; I have studied propagation and there is one point I think will be new to you. I had difficulty in propagating hickories and pecans until I got the thought of hermetically sealing the scion. I first used gum shellac, but later I found that by covering the scion with grafting wax completely it serves the same purpose as the paper. It takes the place of all that wrapping, except right at the wound, and does away with the sacks. I have tried them and I much prefer covering with grafting wax. Your buds will come right through the wax, and you don't have to bother about taking off the sacks, and there is no danger of leaving the sacks on too long.

The President: That is a very good suggestion, Mr. Riehl. There might be some discussion of that. It occurs to me that with that method it is very essential you have the right kind of grafting wax, otherwise it might injure your bark. Are there any suggestions or questions before we finish the grafting demonstration?

Mr. Riehl: I wish to emphasize the fact that the wax must not be too hot.

The President: What is your formula, Mr. Riehl?

Mr. Riehl: Four of resin, two of beeswax and one of linseed oil.

The President: Are there any further questions?

Mr. Dorr: Suppose I wanted to get a certain variety of tree by grafting. For instance if I couldn't buy the white Heath Cling peach then my only resource would be to bud on another tree. But suppose I struck a nursery where I could get good seedlings of this tree. Wouldn't a natural tree be preferable to the budded one?

The President: There are no true seedlings, so far as I know.

Mr. Dorr: Do you mean there are none at all true to seed?

The President: No, nut trees do not come true to variety. In other words, Mr. Dorr, I might put it this way. In the big Green River orchard over here there are some of the very best pecan trees, but those of us who have been observing them for years have found it is only through propagation we can get a Green River and a Major. It would be a failure to get the nuts and plant them and hope to get the varieties that exists there, just as it would to plant some nut that grows a hundred miles away, because the pollen up and down the river would mix in these varieties. It is the same way with the walnut, when you undertake to plant an English walnut and get it true to the seed, you are going to have a failure. If you plant a Rush walnut you may get a nut that resembles it but there is no probability of its being a true Rush walnut. That is why we have these discussions of budding and grafting. We should be glad if seedlings would come true but they do not. I will show you tomorrow, at Enterprise, the great variety of seedling pecans, and I want you to look them over well.

Professor Smith. May I answer his question? I think he asked, which is better the tree from the nursery, the natural tree, or a grafted tree?

The President: If he did, I didn't understand.

Professor Smith: That was the question, and I will say he can't find a Heath Cling, unless it is top worked.

Mr. Dorr: Some farmers who have tried a great many experiments hold to this theory: If you select the seed properly you can produce fruit as good as the nurseries produce it. The things the schools teach don't coincide with what those practical farmers observe.

Professor Smith: When you try to find farmers more practical than these men here, you have got some to find.

The President: The farmer who says he can do that is mistaken.

Mr. Dorr: He says the same thing about you. When I buy a grafted tree a storm comes along and breaks it where it was grafted. If I can get a perfect seedling I will have a stronger tree.

Mr. McElderry: The very thing he is inquiring about has cost Posey County thousands of dollars. Men tell them they have trees that are better than the nurserymen sell and they bite and find they are mistaken. But they get them and pay from ten to fifteen cents more than they would to the dealer. There is no man on earth that can keep the Heath Cling true in that way, or any other variety on earth.

Professor Close: I want to say a word. Two or three people have made the statement here that it is absolutely impossible to propagate any peach or other fruit true from seed. We have been doing it for years. I believe the orchard peach will come true to the seed. With apples there are groups that will come true to the group but not the variety.

The President: I am glad to hear that statement. I have understood that the Indian peach will come true to that group but it will not be the big Indian peach you have planted. It is a fact that some of those groups have a tendency to come true to the group.

Professor Close: Yes, they come true to the group and so will apples.

Mr. Dorr. May I ask another question? What has become of some of those beautiful, delicious seedlings in southern Indiana they had when I was a boy?

The President: The same thing that became of Washington and Lincoln—they died.

Mr. McElderry: It is a boy's taste, not the peach, that makes it seem better than the ones we have now.

Mr. W. C. Reed: I feel that Mr. McCoy discouraged us too much about grafting. I think either method he used will succeed very well. The main point is the time of the year it is done. Up to a year ago we began grafting a few days after the first of April, and continued up to the first of May, and our success varied from ninety per cent to nothing. We decided there was too much sap and went to budding. The last grafting we did gave us the only real good stand we got, that which we did from the first to the tenth of May. We had as good results then as we did in budding.

The President: That is good, Mr. Reed. I think those facts ought to be brought out and made a matter of a record.

Mr. Reed: I think it is more the time in grafting than anything else.

Mr. McCoy: Mr. Reed has a clay soil and that does not furnish the rapid flow of sap that a warm sandy soil does.

Mr. Reed: You would have to begin grafting earlier.

Mr. McCoy: Yes sir.

Mr. White: Do you leave that cover of paper on when you cover it with wax?

Mr. Reed: On part of them we did and on part of them we did not. In grafting walnut trees this season we left some of it on.

Mr. Woods: Just a question as to the strength of that slip grafting. Will it blow off easily?

Mr. White: The first year it will blow off a little bit easily. The first year you will have to tie it.

The President: Are there any further suggestions? If not the next thing on the program will be a talk by Dr. J. Russell Smith of the University of Pennsylvania.

Professor Smith: Mr. Chairman, and Ladies and Gentlemen: We have to educate the public—my good friend down by the window, I hope he will not take my remarks personally—is a case in point. He has come in with an argument, which the gentlemen next him says has cost his county lots of money. I am a grower of apples, an experimenter in nuts and I raise peaches to eat. I am planting seedling peaches and I know that when I go on that hillside of mine I can get little red seedling peaches and plant them and get the same kind, which have, I think, as much sugar and flavor as any big peach two inches or two and a half in diameter. I raise them true to the type too, but I would not think of putting out a commercial orchard of seedling peaches. My neighbor tried it, to his financial sorrow.

But it is surprising how this seedling error sticks. People are going to be buying seedling trees twenty-five years hence and thinking they are getting the best to be had. Here is an article that bears me out. Here is an editor who has published a very glaring thing. This is No. 139, Vol. 113 of a paper devoted primarily to ginseng. This question was asked: "What do you know about the Pomeroy English walnut trees and fruit?" and the editor answers: "The Pomeroy walnut trees are all right and you will find at least nineteen out of twenty hardy. That is what I find here and we often get it down to 20 below zero. The nuts are of good quality. Beware of the Pomeroy trees offered by the Rochester nurserymen. These are grafted trees. Pomeroy raises his trees on their own roots, all of them are true seedlings, and that is why once in a great while one turns out tender."

Mr. Dorr: I believe I am as old as you are and have gone the same gait exactly. I lost my job and went to farming. I was once a college professor, too, but there are things I find now I didn't find

J. RUSSELL SMITH

President of the Northern Nut Growers Association

then. Two nurserymen come to me and sell me two Grimes Golden apples. I plant them side by side and they do not turn out alike. Why not if they are grafted trees? I am not knocking, you misunderstand me, I am a truth seeker.

Professor Smith: I believe that. We always find something we didn't buy. My head man says they jump in. I have some very fine specimens that came by accident, and of course we have a certain amount of bud variation. We find variety even by propagation. The trees will vary the same as people will but they will vary a great deal more if we get the seedlings. The successful growth of nuts, as of any other fruit, demands the use of top worked trees from the best known parentage. That is the way we do with apples, peaches, pears, and cherries. Nuts will have to come in the same class from the best known parentage. The big thing today is to find out the best known parentage and then spread knowledge so that no editor will be capable of fooling people as in the article I read a few minutes ago.

That is point number one. My point number two is a different one. It is the question of the names of the varieties of northern nut trees, particularly the names of the pecan trees. Twenty years from now there will be a million people in the North who will gravely tell us the pecan grows down South, not in Indiana, and that you can't grow them up here. I haven't a doubt there will be a million people that will believe that twenty years hence. How can we get that idea out of their heads? I think we have an agency in the mere names of the trees which will cause people to buy more, yes a hundred thousand or two hundred thousand more trees, than they do at the present time. If we pick out one name, Indiana, what does it mean? It will make a man ask questions, and if he has any curiosity at all he will want to know if it grows in Indiana and if it will grow in any state with practically the same latitude as Indiana. But if he hears the name Schley, what does it mean? Nothing, because practically everybody has quit thinking about Admiral Schley. I recall eight varieties of northern pecans three of which have good names and three perfectly worthless ones. Indiana, Kentucky and Green River are the good ones. Green River is the least valuable because it is not well enough known. Indiana and Kentucky are great names because they are the names of great states. Then we have Busseron, Warrick, Posey and Buttrick. The Busseron nut which grows up at Vincennes ought to be renamed Vincennes. There will be thousands more sold in Vincennes when it is known from the name that it did not originate in Pennsylvania

but that it is a product of Vincennes. My point is this, it gets a name that shows it to be a northern product. I am not going to fight for that particular name but it is growing at Vincennes and that is a perfectly good reason for it to be named after that well known city. Now we come to the Posey. It grows on the banks of the Wabash and ought to be named the Wabash. Nobody knows anything about Posey County and what the reason is for the name, but the banks of the Wabash where it grows have been made famous in song. We can hook a sign on that pecan that will sell twenty or thirty thousand more Poseys than are sold now. Next we have the Buttrick which is found growing in Illinois. That is the reason why those Buttrick pecans will sell under the name of Illinois. It is named for a man but it doesn't mean anything in the world but women's dress patterns and is not a good name for a pecan.

Mr. McCoy: A change in a name like Buttrick to Illinois is a good one. Any name like this that tells by itself the fact that the nut is from the North is worth a lot to the people who want to sell pecan trees, and to the people who want to eat pecans, and can buy them reasonably. Therefore, Mr. Chairman, I move that a special committee be appointed to consider changing the names of these pecans and giving them names showing that they are northern nuts.

Mr. Potter: I second that motion.

The President: It has been moved and seconded that a committee be appointed to consider the matter of changing the names of some of the pecans.

A Member: Isn't there a Vincennes in Europe?

The President: There might possibly be more suggestions, and we should be glad to hear from anyone along this line.

Mr. Reed: I agree with Professor Smith in part of his remarks. We have a walnut called the Ontario from Greene County, Michigan. If we should call it Michigan that would indicate where it came from. But it is widely known now as the Ontario, and would it be best to change its name, even though it comes from Michigan?

Mr. McCoy: Wouldn't it have been better to have called it Michigan to start with?

Mr. Reed: I think so.

Mr. McCoy: We have pursued these things for many years and we have made some misnomers in naming them. I think it's a good idea to change them.

Mr. Potter: I am very much pleased with the idea Professor Smith has advanced for renaming these trees. They don't mean

anything now as he says, and I think it would be a great forward stride for this association to rename these trees.

Mr. Simpson: I think Professor Smith's idea is a move in the right direction. We were the first people that propagated any of these northern varieties, and my idea is to call that variety Indiana, for the very reason he mentions here, that it distinguishes it as a northern variety. I think his suggestion ought to be followed out as far as it is possible. At least with several varieties.

The President: The chair takes the opportunity of saying that the suggestion meets his most hearty approval. I have taken up pages of letters in writing to people about nuts, and explaining to them that the nursery from which they bought had nothing to do with the hardiness of the tree, that it was the location of the parent tree that determined this. I was struck by an advertisement last year which said, "buy them from the nursery furthest north." That hasn't a thing in the world to do with it. You may take some of this very wood we have here and propagate it on the McKenzie River, or the Yukon, and say you are selling trees propagated in Alaska, but the hardiness all depends on where the parent tree is. These parent trees have been placed there by nature, and when we distribute them we will distribute what nature has put into the parent tree. These trees are there because they have withstood all the climatic conditions, and nothing would be of more value, it appears to me, than to adopt the suggestion for renaming them. In the first place many of these trees are named for men not entitled to have them named for them. Many of those who own these trees do not know their value and object to anyone that knows anything about a nut tree going in and getting bud wood, and are contrary and mean about it. It is very rare that the importance of these seedling pecans is known to their owners, and they are not entitled to any consideration themselves. They are generally discovered by some outsider who had to beg to go in and get a stick of bud wood. Is there any further discussion?

Mr. C. A. Reed: You are right about that. But I would like to go on record in opposition to this movement. When pecans are recorded in the standard works the names stay. The rule is generally accepted that where the names have once been recorded no other name can be permitted. It is easy enough for us to vote to change a name but not so easy to change it in actual practice. How many of us will know these pecans that Prof. Smith has mentioned by any other names than those that have already been

accepted. Suppose we do rename them, we shall have to explain that they are the old pecans under the new names.

Mr. McCoy: We remember well when we changed the name of the Green River. We decided that among ourselves here. The Posey pecan used to be the Grayville and you know when we changed it. I call it the Grayville yet because I got used to that. You changed it to Posey thinking it was from Posey County but it really is from Gibson County. I have no doubt many of these men here call it the Grayville, and then lots of men that hear me call it the Grayville ask me what I mean as they don't recognize it under the old name. I am in favor of changing these names. I named some of them and you know it, but I didn't always name them right and you have changed them here. Can't we do it again if it will sell them?

The Secretary: What is the motion exactly?

The President: As I understood it was to appoint a special committee to take up the matter, and consider changing these names.

The Secretary: Why should we do that when we have already a committee on nomenclature? What is the use of a special committee?

Mr. Potter: The special committee will report quicker,

The President: If it belongs to the committee on nomenclature to consider the matter it will be best to do it now, immediately. If the names are to be changed they ought not go another year, and if not to be changed it ought to be known. The chair will be glad to entertain a motion that the committee report tomorrow on it.

Mr. Potter: I make a motion that the matter be referred to the committee on nomenclature and that they be ordered to report tomorrow.

The President: Do I hear a second?

A Member: I second the motion.

C. A. Reed: I am the chairman of that committee and I could not report tomorrow so I will ask that if it is to be taken up by committee that a special committee be appointed.

The President: It is Mr. W. C. Reed who is the chairman of that committee, to which committee was added C. A. Reed and R. L. McCoy.

Professor Close: I would like to ask Mr. Reed if he is absolutely sure about the rule he has just quoted of the American Pomological Society, that a name cannot be changed. I don't remember that rule.

Mr. Reed: Mr. Taylor was the framer of that rule and in actual practice he has adhered to the first name used, and did at the time he was secretary of that society.

Professor Close: Have you not in mind the rule that a name like Posey being given this variety no other variety can be given that same name. I think that is the rule you are thinking of.

Mr. Reed: No, but that is true too. You know we had the Sovereign pecan, and after that name had been established Mr. Taylor wrote up that variety for the yearbook, and the name had been changed then to the Texas Prolific, but he still retained the name of Sovereign for the reason that it had been called that before.

Professor Close: It seems to me that an organization could change a name. I think the idea is a good one. Take the name Indiana. I think that name ought to be given to the very best seedling variety that is a native of that state. I don't know whether the Indiana is the best one or not, but it is now too late to change that. If it is not the best the name will have to stick to the variety to which it has been given, even if later on better varieties are found.

Mr. McCoy: I know there are some extremely fine pecans on the Illinois River because I have some samples of them, a good bit better than the ones we have, and I suggest that we reserve the name Illinois, which would be suggestive of both the river and the state, for one of them. I know the nuts are there and I think they are very fine. The Illinois River has more pecans on it than the Wabash.

Dr. Deming: I second the motion.

The President: It has been moved and seconded that the matter of changing the names of these nuts as suggested by Dr. Smith, be referred to the committee on nomenclature, and that they be instructed to report tomorrow.

(Motion carried.)

The President: We have with us this afternoon, the state entomologist, Mr. Baldwin, who knows many things of interest to nut growers, and we shall be glad to hear from him.

Mr. Baldwin: Mr. Chairman, and Members of the Nut Growers Association: I am wholly unprepared to make a talk before this association and must say I am not sufficiently familiar with nut culture to be able to tell you anything of interest along that line of work. Your discussion relative to the pollenization of plants was intensely interesting and clear. There is no use in trying to dodge the fact that every plant has a father and mother, and that father and mother also have fathers and mothers, the same as we have. The reason I am not just the same as you is because I have

a different father and mother, and the reason I am not just the same as my brother is because the characteristics of the parent may show in one individual and not another. If your pecan trees should stand out in an isolated situation and pollenate themselves the individual nuts would not all be the same. We have peaches that come nearly true to name, and the same is true of the Snow apple that has been grown in the St. Lawrence valley for generations. The pollenization of budded and grafted fruit trees or nut trees is brought about, in my opinion, wholly by the surroundings or environment of that tree. The well known experiments of the Geneva Experiment Station have very satisfactorily proved that the variety does not change except in so far as the environment changes it. Of course there are some things in nature we do not understand as where very decided deviations, or wholly distinct varieties arise; but the general rule holds, that whenever you propagate trees, and get your buds from some variety having merits, those merits will be transferred to the trees that are budded or grafted, and will remain in them while the surrounding conditions remain the same, and changes in the fruit will be effected only by changes in the locations in which the trees grow.

I suppose that as I am the entomologist of this state you expected to hear some discussion of things of interest to you in this particular field, but I came wholly unprepared for that. In this state so far as the nut growers industry is concerned we have not done anything at all. There is a large field for work but I must confess I am wholly unprepared to give you a talk on this subject. Where I was raised, back in Pennsylvania, we have several well known bugs that the nut growers have to contend with, and they are especially abundant with the chestnut. That of course would not be of so much interest to the people of this state until the chestnut growing industry has developed more than at present. I am very glad to be with you and the discussions I have heard have been very interesting.

The President: We are very glad to have heard from the state entomologist and we want his assistance. We are trying to steer away from bugs and we want his suggestions and help at any time.

We have a number of interesting people on the program yet this afternoon, but the chair is going to take the liberty of asking the president of the National Nut Growers Association, Dr. C. A. Van Duzee to talk to us on any subject that he cares to discuss. I know him well enough to know that anything he says will be good enough to hear. I know him personally, the most of you know him

by reputation. He has some pictures here, and I shall take the liberty of passing them around for you to look at, and I am going to say that these are pictures it certainly does my heart good to see. They are pictures of his orchard down South. Just pass them around please.

Col. Van Duzee: Mr. Chairman, Ladies and Gentlemen: I told your President the first thing when I got in this morning that I didn't care to have any place on the program; that I would be glad to talk at any time on any subject he wished me to, and do anything I could to help along. That puts me in bad to start with. As I have listened to the discussions of your meeting the thought has come to me that you are following along very much the same pathway that the southern nut growers traversed five or six or seven years ago. We are a little further along in the growing of nut orchards in the South, but you are certainly going to get along and be abreast of us in time. Perhaps I may be able to do more good if I confine myself to a few practical suggestions as to how I think nut orchards can best be produced. Those pictures represent an orchard which I have in southwestern Georgia and have grown under adverse conditions. The pictures show the culmination of years of earnest effort. They represent what I consider to be a very reasonable success from a practical standpoint. I am a farmer and the first thing I require of my farm is that it shall pay. I have no theories; I have no ideals but those which must stand that test. I am in farming to make it a success; it is my business and everything I do must stand that test. If it doesn't pay it is not successful. That orchard represents the culmination of years of study of the problem of how to grow a pecan orchard on my ranch. That bunch of hogs represents about one hundred and fifty we selected about three weeks ago to put in our early peanut patch down there to finish them up as pork, but it does not show my breeders or young stock. I could talk hogs to you until the cows come home. I set my mark a year ago last spring, after being twice wiped out by the cholera, I set my mark at fifty thousand pounds of meat from my orchard, and I want to say I have animals now in the orchard and in the peanut field together to make that and a little margin to the good. I expect our orchard will produce this year more than fifty thousand pounds of hams, bacon and lard. The reason I am talking about this is that I want to emphasize the fact that the growing of nut trees is a business proposition. I want to say, in passing, that I believe no better thing could happen to the people who live in America than that every man who owns land might plant a few

nut trees. It is a notorious fact that the nut trees which do the best, and which make the most money for the man who plants them, are the ones planted in the garden and immediately about the home where the conditions are favorable for the best development. It is also true that all the successful pecan promotions that have been put over on the American people have been built upon the records of those individual trees, which were grown under the most favorable conditions. That is the source of all that magnificent literature, and all these people that have been inveigled into these promotions in the South are going to be disappointed. That orchard in the photographs is eight years of age, or will be this year, as it was planted seven years ago last February. It has never paid a dollar of profit. You won't find any literature on nut orcharding in the South that will convey any such impression as that. I do expect it to pay this fall a small margin of profit. I won't attempt to explain all that but will say that an orchard must be eight or ten years of age before you may expect or hope for a reasonable profit. After that it ought to pay well. It is well worth going after because it is one of the most legitimate, safe, satisfactory business opportunities we have ever found. I don't know anything that pleases me more as a business man than the growing of a large orchard of nut trees, and I assure you, gentlemen, you must bring to that orchard the same degree of skill, energy and patience that must be brought into any large business proposition to make it a success. My own idea is that the nut orchard is a legitimate part of the general farming operation. If you travel from one end to the other of this country you will see that it is covered with apple orchards. Small apple orchards were a part of the original farming operations. The fact that they have been neglected does not alter the situation at all. If the owners of those orchards had given them proper growing conditions, they would have been successful. In the same way I say the successful nut orchard is going to be a legitimate part of the general farming operation.

I want to talk to you a few minutes from a business standpoint. Suppose you want to plant an acre of nut trees, and you buy an acre of land, and you buy your trees and have them planted. Who is going to take care of them? You hire a man who knows about the care of trees. You couldn't afford to hire one who didn't, and you would expect him to put in part of his time some other way. If he didn't your investment would amount up to so much you couldn't make anything on the deal. I emphasize this fact because I believe you should make your nut orchard propositions large

enough so that you could afford to hire the best men to handle them for you. If you can't do this there is another way which has been practiced a great deal in the South and which I hope to see practiced in this section. I have worked out a solution of the problem, which I believe is very promising, and it is this: Get enough men, for instance in the city of Evansville, who want nut orchards, to go out a few miles and buy a bunch of farms, and put those farms under the management of a man big enough to make them a success, then plant your orchard, and use the land for general farming operations as well. I could go on indefinitely along this line because it is inexhaustible. I think it is the keynote to success in growing nuts. You can't be successful without giving attention also to the things I talked about this morning. You have to analyze the root pasture and the soil. You have to observe from the time the trees are bought and delivered, and it requires the most careful attention. You can't hope to accomplish a thing like that until you do give it your most careful attention. If you have money of your own, or make your living in some other way while the trees are growing, and feel that you must delegate it to somebody else, associate with yourself other men and make the undertaking big enough so you can hire the very best talent the country affords. In this section of the country land I presume is worth a hundred to two hundred dollars an acre, and you have got to make it pay interest. I want to talk about the figures. The farmer or nut grower, who does not keep a set of books and can't tell you at the end of the year whether he has made enough money to pay off his bills and legitimate expenses, and allowing himself a compensation for the time energy and experience put in the business, is not successful, and I don't care to consider him, because he is not a farmer as I see him. You must keep your figures and know how you stand. Before I get to the photographs I want to go back to our convention at Chattanooga. I don't know whether there is anybody here that was at that meeting or not. I was third man on the program to respond to the address of welcome by the mayor of the city, and I was new in the nut game and new in the South. I went up there with this thought, "I will listen to the other fellows, and take my cue from them, and make a little bluff at doing the best I can under the circumstances." To make a long story short, when the president called on the other two men to respond they were not there and that left me with an audience of four or five hundred people to talk to and nothing much to say. I apologized to them for being unable to talk in a light way. I said, "I can't say anything unless it is in earnest; I have got to

talk about something I am interested in." I went on to advocate this principle, and it is a principle I wish every man or woman in America would grasp and retain and put in execution today; that is that the calling of agriculture is the most honorable calling a man can follow, and it is up to us to inspire in the children of America the thought that such is the case, and help them in every way to go out into the field of agriculture and be successful farmers. That is what I want to say. I have no patience with the men who farm and are not successful business men, because they are the people that make life in the rural districts objectionable to the children, and are responsible for the children of the best blood in the country going into the turmoil of the city where it is largely lost. You have to pay interest on the land you use, and you have got to pay yourself a fair compensation for the brains and energy you use on it. I want to call your attention to one other thing. This farm I bought nine years ago from a man who had farmed it until it wasn't capable of producing enough income to enable him to keep it, and I undertook to build an orchard on that farm, and I have done it. Last October, where these hogs are grazing in the picture, I planted a crop of oats and I got forty bushels of oats to the acre the latter part of April. I then turned around and broke the land up and planted it in sweet potatoes, which are just maturing and the crop will run one hundred and fifty bushels to the acre. Don't forget that that is two crops grown and harvested in one year on the same land. I consider it the best treatment for the land. I pastured the oats last winter with the hogs, so I get a very material gain from the oats in that way, and as soon as my sweet potatoes are harvested I will turn the hogs back in and let them glean the field. It is a fact that we can make lots of pork on the gleanings of a sweet potato field. And besides that these trees, each one of them, will bring me four, to five, or six dollars' worth of nuts. That land cost me sixteen dollars an acre, and there is a net income of several dollars above the price of the land, and I presume there is an individual growth on each tree that increases its value at least four or five dollars' worth of nuts. There you see I have several dollars' worth of nuts, the sweet potatoes and the oats all grown on the same land, besides the pasture for the hogs. Those things are possible to the man who will go into the growing of a nut orchard in a business way. I have other land adjoining this and I will also utilize it for these purposes and grow such crops as I can grow in the orchard, because when the nut crop is ready to gather, I must get the stock out. I keep my organization employed the whole year. I have the best super-

intendent I know of and I have to make his salary out of my business. I get the best tree man I know of and he also receives his compensation from the money I make in farming. Last year I extended my farming operations in order to make it possible for me to keep my organization running full speed three hundred days in the year. I am dwelling upon this line for this purpose. Don't let any promoters ever get his hooks into you or tell you things as we have had them told to us down there. Thousands and thousands of acres of pecan orchards have been planted without a thought of the things I am talking about. They have planted thousands of acres in Georgia; they have not any organization and the man in charge is inexperienced and they don't pay. Each year from the time I planted my orchard, and got it to the point where I could count on an orchard crop, it has increased in value, and today it is worth four or five dollars a tree above what it cost me. It is a magnificent business proposition. I am so in love with my work I could talk to you until the cows come home. I want to impress on the people of the Northern Nut Growers Association and their friends the one fact that in order to be successful in a commercial way you must go into it right. There is no short cut.

The President: The next on the program will be an article by Mr. Olcott.

THE FUNCTION OF THE CLASS JOURNAL

Ralph T. Olcott, *Editor "American Nut Journal"*

In the multiplicity of publications one must distinguish, for his use, those which are for entertainment or general education and those which specialize. Class publications differ from trade or professional publications in that they are not confined in their appeal to the members of a trade or profession. The class publication is for that portion of the general public which is wholly, or to a certain degree, interested in the particular object to which it is devoted.

What has been said with regard to class publications is probably understood in a general way, but a brief consideration of its bearing upon the nut industry may make the status of a nut journal clearer. Let us suppose that an industry has no publication devoted especially to it. It must then depend upon communications between individuals and upon annual meetings and their printed proceedings for its interchange of thought; for it is presumed that it will have a national or sectional organization. A very efficient organization with the means at hand to serve its members well can do a great

deal to keep members in touch with each other and to advance the interests of the industry. Organization, of course, is essential; but without a periodical exponent there is lacking the advantage to all readers of general timely discussion, questions asked and answered, special articles, illustrations and the news relating exclusively to the industry—all of which makes the periodical a working tool, and its bound and indexed files an almost indispensable adjunct to the literature and reference storehouse of the field covered.

Not only to the individual, but also to the class association do these characteristics appeal with special force. For, unlike the trade journal, it goes out among the general public as a factor in the education of those who seek information of the special kind. In this way it is a means for extending the operation of the industry, and consequently of increasing the membership and influence of the association. And right here is a point which those who have been operating in the industry for some time should consider. If any portion of the general public is to receive through the class journal the information desired, there must of necessity appear in the journal from time to time statistical or other matter with which the experienced nut grower is familiar. To a considerable extent the novice may be referred to existing literature on a special subject; but not all of such literature is readily available. For instance, the *American Nut Journal* has been carrying in each issue a summary of the figures showing the progress of the American nut industry. These figures have been seen repeatedly by experienced growers, but even for them they may prove convenient for reference; and certainly to the newcomer they should be interesting and valuable. Original matter, of course, must be the basis upon which the contents of a class publication are built. But an article, or a portion of an article, which has an important bearing on the specialty under consideration may often be reproduced in the class publication, even though it may have appeared elsewhere; for we are all too busy to read many publications, and the chief purpose of the class publication is to assemble from all sources that which particularly relates to the subject. In theory at least the class journal should be the storehouse to which in its bound and indexed form the subscriber may go for information on any phase of the special subject. That is a high and not altogether attainable ideal, but the nearer the journal approaches to that aim the more valuable will it be to its subscribers. It should at least record the sources of all information on its special subject, even if it cannot present it all.

What has here been said in outline regarding the function of the

class journal will indicate to the nut grower the place the *American Nut Journal* should occupy in the development of nut culture. It is unnecessary to say that co-operation between the editor and those in the industry is essential, and for that reason all should feel free to exchange views through this medium. Aside from the practical benefit it may be to the individual, it is a constant source of publicity for the organized effort represented in an association of nut growers—and it is through publicity that an industry develops.

To deserve the co-operation of all in the industry the management of the class publication representing it must determine what is the highest and largest function of the field which it serves and then strive in every legitimate way to promote that function.

To deserve the manifold advantages which such a publication affords it is incumbent upon those in the industry, on their part, to make it possible through their subscriptions and through their advertising to maintain such a medium. It is probable that if there were no such publication every loyal member of this association would gladly pledge ten cents a month provided some one could be found who would expend the time and effort to provide it. Just that opportunity has been presented, and it is a pleasure to say that many have appreciated it.

The President: There is no one thing that would get results for you better than a good periodical. The Department of Agriculture issues bulletins but that department cannot go into the journal business, the business of publishing my opinion or someone else's opinion. The Department of Agriculture must confine itself to the summaries of facts, and that leaves a gap that must be filled in by some good periodical properly edited. It is with great pleasure that we see the *American Nut Journal* which Mr. Olcott is putting out and attempting to give us the best he can get. The chair will be glad to hear any further suggestions on this subject.

W. C. Reed: I think we are very fortunate in having a journal of this kind, and having known Mr. Olcott for a number of years I know he is giving the people a good journal. I think it is customary in most instances for all trade organizations to have their journal, and I think in this case the Northern Nut Growers Association ought to adopt *The American Nut Journal* as their official organ. I make that as a motion.

Mr. McCoy: I second the motion.

The President: It has been moved and seconded that we adopt *The American Nut Journal* as the official organ of our association.

(Motion unanimously carried.)

THE PRESIDENT: Mr. W. C. Reed, you have something on the program and we will be glad to hear from you now.

MR. REED: I had prepared a short paper on top working the black walnut with the Persian or English walnut but I won't read the paper on account of the limited time, for there are others here we would rather hear from. Quite a number of you are going to Vincennes and you can ask questions there and understand it better than I can tell you here. However there may be some that can't go along, so any questions you want to ask at this time I will be glad to answer.

MR. POTTER: It will be impossible for me to go to Vincennes on Saturday as I have to go home tomorrow night. I would like to ask Mr. Reed if the method of grafting the pecan is the same as top working the black walnut?

MR. REED: Yes sir. Suppose this is a large tree twelve, eighteen or twenty inches in diameter. We cut the limbs back to where they are four or five inches in diameter and, supposing that we want to graft this limb here, we will cut it up here one or two feet because it is hard to cut limbs without their splitting. Sometimes they will split on both sides. For that reason we cut them high and then again, later, back to where we want to graft. We usually find it best to do the first cutting back along the latter part of February or first of March, and when it gets time to do our grafting we cut them off again about two inches so that we shall have fresh wood. We saw them with a fine tooth saw. We prefer to do our grafting from about the first to the tenth of May. We keep scions in cold storage. I think that is quite an advantage although I haven't tried the walnut in cold storage until this year and hadn't thought very much about it until the last few years: but we find the ones we were most successful with were the ones we had kept in cold storage.

PROFESSOR SMITH: What time were they cut?

MR. REED: In February, I think, but I think it would be much better if they were cut in November or early December, especially the walnut, and I shall do that this year. With the pecans I don't think it will make any difference.

PROFESSOR SMITH: What temperature in storage do you use?

MR. REED: Ordinary apple storage, thirty-two to thirty-eight, or freezing. This spring we grafted between the first and tenth of May; some of the trees were in full leaf. The sap was flowing very readily and they bled very freely, although the ones that had been

W. C. REED

Vice-President of the Northern Nut Growers Association

cut back early would not bleed like the ones you cut when you are ready to graft. In grafting we used the wedge graft, splitting straight down and placing three or four scions on each limb three or four inches in diameter. However the method we like the best is the slip bark method, but we have had fairly good results with both methods. Of the trees we grafted this spring 60 to 75 per cent were grafted from cold storage scions. We used some that had not been in cold storage, and we didn't get them to grow. We wax the grafts thoroughly and cover them with paper sacks. We do not use any tying on the large limbs as we don't find it necessary. However, we have done more budding than grafting in top working large trees and I think it is a little surer, but we have been fairly successful with both. For budding we cut them back the same as if we were going to graft. We let the sprouts grow until about the middle of July or first or middle of August, and we have let them go as late as the first of September. Then they are ready for budding. We follow about the same method as has been demonstrated. In working large trees it is very important that you keep all cuts waxed thoroughly with grafting wax.

Mr. McCoy: Have you had this experience, that English walnuts will produce female blooms before they do the male blooms?

Mr. Reed: We haven't had them long enough to determine that clearly. We have eight trees and four of them produced pistillate blooms and we had to bring pollen to pollenize them.

Mr. McCoy: It is possible to have your sprouts almost where you want them by taking the sharp end of an old file and dressing the bark carefully. The buds are more apt to come there than anywhere.

Mr. Reed: We sometimes lose a good many shoots from storms. One tree was budded about three weeks ago and that storm about ten days ago broke every one of them.

Mr. Pomeroy: What time did you say to bud the black walnut?

Mr. Reed: About the first of August, from the middle of July to the middle of August, as a rule. We are budding some yet. That depends on the wood; do it when the wood is ripe enough. We are holding back on some now to get the wood ripe enough, and as fast as they get ripe enough we bud them. You can bud them late if you cut them back freely in the spring, smooth with the ground. Then your buds will take much more rapidly because you have the sap.

Mr. McCoy: Have you had the best success when you cut your trees back in the pruning season? In slip bark grafting there

are two ways, you know. One is to wait until you are ready to graft and then cut back. Which do you think is the best?

Mr. Reed: In top working the large trees we had the best success cutting back early, that is in the nursery. We have never cut back any at the time we were ready to do the work.

Mr. McCoy: In other words you head off the sap flow?

Mr. Reed: Yes sir, we hold it back.

J. F. Wilkinson: Do you find it any advantage to cut your leaflets off before you bud?

Mr. Reed: I haven't tried that enough to know. When you were at our place some of them had been trimmed in full leaf and had dropped the leaf stalk, and some had been cut off three weeks and still didn't let loose. We can tell more next spring as I kept a record of that.

Mr. Pomeroy: How do you know when it is ripe enough?

Mr. Reed: I don't think a man lives who knows exactly. You have to use your own judgment. For instance, when bud wood colors up like this I would feel sure it was ripe enough. When it is green I am more afraid of it, although we have some good success with the green wood, but cold storage wood is still better.

Dr. Morris: Professor Van Deman said the other day that in cutting bud wood at this time of year it is good to give the bud rest for two or three days. He cuts the scions and puts them in the ice house. That gives them rest and the buds start better and are firmer. Has anyone had experience with that way?

Mr. Dorr: There is another question I want to ask. If we want to experiment with the processes that have been suggested here, shouldn't Evansville have a place where we can store scions? We should have an ice house. Some of us who don't have shoes, haven't any ice house. I worked in South Carolina one time and made this discovery, and it almost made me weak. The great majority of farmers in South Carolina are men who make fifty dollars a year; they cultivate three acres and own a mule in partnership with two or three other men. Suppose some enthusiast like this man plants an orchard there. What inducement has he for that kind of work? The dream I have had here for Evansville, which is my home, is to bring some of that kind of work into the high schools.

Mr. White: In regard to the point brought out by Dr. Morris about cold storage bud wood, I believe that it is better for being chilled. We have found it hastens the callous. The same theory has been borne out by the work of the Department of Agriculture

in propagating the blueberry. They found it would not callous and form roots unless they chilled it. Isn't that right, Mr. Close?

PROFESSOR CLOSE: I don't remember that.

MR. WHITE: I think all wood must be frozen or chilled, or put in cold storage, before it will take well. I found that by putting scions in cold storage they callous much more readily. Where the temperature is near the freezing point walnut and pecan wood will callous more readily. On some that I took out on the 31st of July I had written the names, and the callous had formed until we could scarcely read the names. In a week or ten days the callous was around them. On new wood, it would take twice as long.

PROFESSOR SMITH: If they had calloused in cold storage was it because they had been too warm?

MR. WHITE: No sir. If you will take a tree that you want to set out and cover the roots until you can set it out, you will find the callous forming no matter if the ground is frozen hard.

PROFESSOR SMITH: You mean a tree planted in the fall?

MR. WHITE: Yes sir.

MR. POMEROY: Where one had no cold storage what would he do?

THE PRESIDENT: If you haven't cold storage, such as Evansville affords, and have an ice house you can use that. It is very important to pack the scions in excelsior and sawdust and be sure there is very slight moisture, and to paper line your boxes. Colonel Sober keeps chestnut scions by standing them on end in cans. He fills in with a thin layer of sawdust, punches holes for them to breathe, puts a lid on and sets them in the ice house and says they keep splendidly.

PROFESSOR SMITH: In an ordinary ice house?

THE PRESIDENT: Yes sir.

COLONEL SOBER: I have kept them that way for two years.

MR. WHITE: Dr. Morris will tell you the next best thing if you haven't cold storage.

DR. MORRIS: We use a method I got from Professor Craig, the way he kept his for many years. His plan was to set a plain wooden box very smoothly on the ground, smooth off the ground so the box would set evenly on all sides, then pack in a layer of perhaps half an inch of fine leaves like black locust leaves, and on that he would put a single layer of scions, then more leaves and scions.

MR. MOSELEY: If you have an ordinary ice box, would that be cold enough to put the buds in?

DR. MORRIS: I think that would be plenty cold enough. I know

of a man in Maryland that has been using that for a number of years.

THE SECRETARY: Do you wax the ends?

DR. MORRIS: Sometimes I do, and sometimes I don't.

THE PRESIDENT: You couldn't keep your scions all the time in an ice box, could you?

DR. MORRIS: No, not for any length of time, but just for a few days you could, in an ordinary refrigerator.

THE PRESIDENT: When you cut your scions in the winter for future use, you should keep them down pretty close to freezing. I used scions in Maryland this spring cut last February in this locality. We put them in cold storage and kept them there until April. Then they were taken out and shipped to me in Washington. They arrived in perfect condition and I took them to a big green house across the street and put them in a long box and set them up in the big refrigerator where they kept their buds. I had these within two inches of a thousand pounds of ice and the Green River proceeded to grow within two weeks. You have to keep them in cold storage. It is so cheap, however, in Evansville that there is no excuse not to keep them in perfect condition. These cold storage people here, Holt & Brandon, are very fine people. We have kept very large amounts of bud wood there and their charges have been very small.

Before we get through I want to call your attention to the rest of the program. Immediately after adjournment there will be automobiles waiting to take all who want to go sight seeing in Evansville. This is by the courtesy of the Evansville Business Association. I want especially again to call your attention to the lecture tonight by Mr. C. A. Reed, and for fear that those here may have an idea that it will be strictly technical I wish to say that he will avoid technicalities as far as possible. He has one of the finest collections of lantern slides I have ever seen. He will take you to the walnut regions of California and to nut regions all over the United States. Any questions asked him will be cheerfully answered but I would suggest that unless there is something extremely important, you reserve your questions until the conclusion of his talk and not interrupt unnecessarily because there are a great many slides to get through with. Those of you who are here, come tonight and bring your friends, bring the ladies and children and everybody else, because it will be interesting and educative generally. Do not forget that we leave in the morning at 7:15, not 16, nor 26; that car will leave at 7:15 and if you will be there on

time we can get together on the car. We will now adjourn until 8 o'clock.

Meeting re-convened at 8:00 P. M.

THE PRESIDENT: The first thing on the program will be an invitation to join the association. For the purposes of our organization we need members, and we especially need anyone who has any interest whatever in nut culture. The membership of persons joining now will expire on the 31st day of December, 1914; the membership dues are $2 per year, which includes a copy of the annual report. By joining now you get this report and the three preceding ones.

PROFESSOR CLOSE: Mr. Chairman, may I say something regarding the annual report?

THE PRESIDENT: We will be glad to hear you, Professor Close.

PROFESSOR CLOSE: It seems to me that those who pay dues for 1914 ought to receive the report of the meeting for 1914 no matter when it is printed, even if it is not for three or four months after the end of the calendar year. In that way the reports will match the calendar year; that is they are the reports for the year that the meeting was held and the papers and discussions took place, and this one should be known as the report for 1914. That is the way we run them in the other societies and it seems to me there would be no confusion at all if it were managed in that way.

THE PRESIDENT: The chair very heartily agrees with that suggestion and thinks that should be the practice of the society. The chair would be very glad to entertain a motion to make that the rule.

PROFESSOR CLOSE: I should be glad to make the motion that the proceedings of the meeting of each calendar year be reported as of that calendar year and distributed to the members who pay dues for that calendar year.

(Seconded and carried unanimously.)

THE PRESIDENT: Are there any other candidates for admission to this society? If so, hold up your hands and our distinguished secretary will visit you immediately. Are there any committee reports?

W. C. REED: The committee on nomenclature desires to report as follows:

Voted on the Smith and Potter resolution to recommend changing the name of the Busseron pecan to Vincennes; Posey pecan to Wabash; Buttrick pecan to Illinois. It was the opinion of the committee that the other names of pecans

had been established by the Department of Agriculture by printing in the year book, and that it was not advisable to change them.

We recommend, as advisable for members introducing new varieties, to confer with the committee on nomenclature before listing new names.

Signed. W. C. Reed,
W. C. Deming.
R. L. McCoy,
R. T. Morris,
C. A. Reed.

A Member: I move the adoption of this report.

A Member: I second the motion.

The President: It has been moved and seconded that the report of the committee on nomenclature be adopted. Are you ready for the question? All in favor of the motion make it known in the usual way. It is unanimously carried that we adopt this report. Are there any other committee reports?

Professor Close: Mr. Chairman, Ladies and Gentlemen: The committee on exhibits has not had a very arduous duty, because we can't have at this time of year very extensive exhibits. But what we have are very interesting. Mr. W. C. Reed has an exhibit of English walnuts, hickory nuts and hardy almonds. You have all noticed the exhibits he has in the glass case. That is very instructive and is put up in such a way that it can be carried from place to place. He also has some photographs of trees. Mr. Wilkinson has an exhibit of fruiting limbs of shagbark hickory and pecans, and various seedlings. To some of us some of those things are almost new. Colonel Sober has an exhibit of grafted chestnut trees. He also has the burrs and in glass jars he has the nuts. Then there is quite an exhibit of the native varieties made by our president, which is very fine. There are also some persimmons. I think, everything considered, the society is to be congratulated upon the quality of the exhibits even though the quantity is not so very great.

The President: If there is no objection the report of the committee on exhibits will be adopted. The report is adopted. Are there any further committee reports?

Mr. Potter: The committee on resolutions reports as follows:

Resolved, That we extend our thanks to the Mayor and the Citizens of Evansville, Indiana, for the courteous entertainment they have favored us with, and for the excellent facilities that they have placed at our disposal.

Second—That we extend to the Evansville Business Association, and to the members thereof, our deep appreciation of their entertainment and courteous treatment that they have extended to our association.

Third—That we extend our deep appreciation and gratitude to Hon. T. P. Littlepage, our president, and Dr. W. C. Deming, our secretary, for their untiring and valuable services in behalf of this association.

Fourth—That we express the thanks of the association to its members and others who have attended this meeting, and helped to make it a success.

Fifth—That we especially extend our thanks and appreciation to Mr. C. A. Reed of the Department of Agriculture at Washington, D. C., and to Col. C. K. Sober, for their excellent lectures and special work in behalf of this association at this meeting.

Sixth—That we express our most sincere thanks and appreciation to J. F. Wilkinson, for his courteous treatment and entertainment of this association at his home.

Seventh—Be it further *resolved*, that we especially thank each and every individual member of this association, for their attendance at this meeting, and for their earnest efforts and interest in behalf of the same, in helping to make this meeting a success in every way, and making it the most enthusiastic meeting that has ever been held by this association, and we thank any and all members for any special work or research that has been carried on by said member in behalf of this association, as disclosed by this meeting.

Eighth—Resolved, That we extend to Mr. W. C. Reed our sincere thanks for his kind invitation to the members of the association to be his guests at his home in Vincennes, Indiana, on Saturday, August 22d, 1914.

Signed. W. O. Potter,
H. R. Weber,
J. Russell Smith.

The President: If there are no objections, the report of the committee on resolutions will be adopted. It is so ordered. The next thing on the program will be the lecture and lantern slides by Mr. C. A. Reed.

Meeting called to order at Enterprise, on Friday, August 21, at 10:30 a. m.

The President: I want the records to show that this meeting convened in Enterprise, Luce Township, Spencer County, Indiana, where the members of the Northern Nut Growers Association visited and studied the native Ohio River pecan trees, and I want to hear the opinions of the different visitors. The state entomologist, Mr. Baldwin, will please express himself upon the native pecan trees on the Ohio River.

Mr. Baldwin: My remarks will be so brief it will not be necessary for me to go forward. I don't know that it is necessary for me to mention the fact that I have never lived in and very seldom visited, localities where pecans grow in this state and cannot, therefore, express an authoritative opinion as to the merits and demerits of the pecan trees in this section. It is noticeable that the trees are

more free from insects and fungus trouble than trees in many places. Mr. Simpson, who has had considerable experience in the South, called my attention to a very destructive pest that does not exist here in numbers sufficient to be destructive, as it is in Florida, but he is of the opinion that it was introduced into that section from this section.

MR. PRESIDENT: What is it?

MR. BALDWIN: Mr. Simpson says—I didn't see any of the insects, and probably you couldn't identify it without labor,—but Mr. Simpson says there are two broods and the second brood is now at work. This certainly is a good field for work for the entomologist. Of course the same thing would hold true with this insect that is true of others; when a new species is introduced into a country where it has not heretofore existed, where the natural parasites are not found, it is more destructive than where the natural parasites exist. That point is illustrated very well by the moths that are so very destructive in New England, and don't do very much damage in the countries from which they come. From my observations on other native nut trees I was greatly impressed with the abundance of nuts that some of the native trees bear here. I am sorry I am not able to talk about something that would be more interesting to those interested in pecans and other nuts.

THE CHAIRMAN: I should be glad to have our secretary put in the record a few of his observations.

DR. DEMING: Mr. Littlepage has been talking to us about these pecans since we started this organization, and has long promised to show us these trees. We can't get any idea of such trees without seeing them. We have had many word pictures of them but I had not been able to form any idea of how great they are. They have a beautiful outline as we see it silhouetted against the sky, and every evidence of being trees that bear lots of nuts, which is the kind of trees we are all looking for. We don't have the pecan tree in the North as a native at all. There are a few in New England, a few scattered here and there, but none bearing. I have heard of a pecan not far from my home, possibly twenty-five miles, that does not bear. I have seen in the city of Hartford a pecan tree that was nine feet and three inches in circumference and ninety feet high, of unknown origin, but not bearing. The nut tree that grows best through our part of the country is the shagbark hickory. It is very much like the pecan tree here, but never grows to anything like its size, is not nearly so beautiful a tree and I don't believe it bears as heavily. I think the average hickory nuts there are very

much inferior to the average pecan here. We also haven't the black walnut there as a native. That is I have never seen it native though it probably was originally so in parts of the country. However, when planted it grows to a very large size, and makes a magnificent tree. About ten miles from my house is the largest in the state. We have lots of butternuts over the country but no nut tree that compares in beauty and usefulness with the pecan here.

THE PRESIDENT: Dr. Smith should be able to size up the situation and give us some of his impressions. I want to get them in the record.

DR. SMITH: Gentlemen, I don't see how anybody can live by these trees here and not realize that they are a source of fortune. I can't understand how men can look at them every year, gather and sell the nuts and not realize that they are a source of livelihood. I just measured a big tree in a tobacco field down the road that was thirteen feet and eleven inches in circumference, that had a sixty foot reach, and was about one hundred and twenty-five feet high. We measured another, that had a sixty-six foot reach and they were all bending down with fruit. It was marvelous and they were certainly giving us their evidence that the thing for us to do is to go ahead and reproduce them.

THE PRESIDENT: Dr. Van Duzee, tell us your impressions of these trees.

COL. VAN DUZEE: Mr. Chairman, I simply will add this. As I came through this wonderfully fertile section of the country, I observed people building bungalows and cottages and setting out trees other than pecan in their dooryards. That is the pity of it. As Dr. Smith says these people here are living close to some of the most magnificent natural trees I have ever seen, and yet they will go and plant around their gardens trees that will do nothing in the world but produce shade. It seems to me there is room for the best kind of missionary work here. I am glad the nut growers met here and I hope the effect will be to cause people to think. As we came down the road we estimated that on one tree there were four or five hundred pounds of nuts. The owner of that tree didn't study the soil that produced that magnificent crop. Our driver said they had had two years of failure in their farming operations and yet right here in the same place nature has handed them another magnificent crop. I have an idea that the average annual value per acre of crops on the farms of southern Indiana and Illinois will run in the neighborhood of a ten dollar bill, and here is a tree, one tree, presenting thirty dollars. I have no doubt in the world that there will be

fifty or sixty dollars' worth of nuts on this tree up here, and it doesn't occupy a quarter of an acre of land.

I want to speak about the insects. I don't believe you need to worry about these unless the planting goes away beyond what I think it will in this section. Here is the proof, right here in this river bottom in the nuts we see on these trees and the growth of the trees. They are thrifty, not mutilated by insects or dying. They are at home and the conditions are absolutely favorable. I have been very much pleased and very glad I came, and if I were not thoroughly tied up in a section I think is more adapted to nut growing, I should come up here and undertake to do something in this section, for I see great possibilities.

THE PRESIDENT: That is an opinion that is of real value. Now I will call for volunteers. Those of you who have been sight seeing here and have impressions and ideas you would like to express we should be glad to hear from.

PROFESSOR CLOSE: One thought that has interested me is this. If we should take away from this neighborhood about half a dozen men this great industry would be forgotten. It is to these men who have done this kind of work that we owe a great deal. They are engaged in a wonderful work. I presume they realize how great it is. It means the developing of an industry that will grow in the United States and could be carried to other countries. These great trees are a wonder, no question about it, and the fact that here is a new industry being pushed by half a dozen men is still more wonderful.

THE PRESIDENT: If this section of the country had been planted to seedling pecans it would have made every man who owned forty acres of it, comfortable. We have with us Mr. Dodd, who is one of the old residents of this neighborhood. He can tell us some interesting things. He was here long before I came and looks at present as if he might be here many years yet. We certainly hope he will be. If it were not for him we would not know that Enterprise is on the map. He reports for the county paper and keeps the world in touch with Enterprise. I should like to hear him tell about the old pecan trees when he first knew them, and I want what he knows about them to go into the record.

MR. DODD: Mr. President, and Ladies and Gentlemen: I'm no speech maker, never made one in my life, but I guess I know something about the pecan business. These trees were here when I came and that was in 1852. Those big trees that you looked at were big trees then, and must have been fifty years old, I judge, from what I have learned from older people. So you see they have been there

a long time. I have a piece of ground here and if I had known as much about the pecan business then as I do now I would have had every foot of my land in pecans. I make a right smart little money in pecans as it is. Littlepage knows that. I have shipped pecans to him off my trees, shipped them to him many times. They are no better than the others, but we are old friends and he wanted me to send them to him and I did. I don't know anything about the pecan business in a general way, as to what they will produce or how much money they will average, but I think we have slept on our rights in this country for seventy-five years. If that is any good to you, you are welcome to it, and we are glad you are here today.

Mr. Pomeroy: One tree out in the back here looks as if it might be fifteen or sixteen years old and it is bearing well. It is a large tree well filled with nuts, notwithstanding the fact that lightning has struck it twice and destroyed at least two years' crops. It seems to me there are thousands of dollars to be made in an investment in nut trees here where they do so well.

The President: Now has any one else any observations to make? Mr. Weber.

Mr. Weber: Out here you remember you showed us quite a number of seedlings growing in a corn field like milkweeds, growing right alongside of them, and one of us thought the milkweeds were the pecans, as they looked much the same. It seems to be hard to keep them down.

The President: That reminds me that when this organization was formed I had the honor of being the first man on the ground. Dr. Deming called the meeting to order, Dr. Morris was there and so was Professor Craig, who has since passed to the great beyond, and a number of others, and I remember telling the bunch who were there at that time, that if I ever had the opportunity I would take them into a country where the pecans really grew. I have attempted to make good. If there remains any doubt in your minds we will proceed to lose you in the great Green River pecan woods, and if you are not pretty well stocked with provisions, you may never get out. I told Professor Close who is making a study of the pawpaw for the Department of Agriculture, that we also grew pawpaws in southern Indiana and that I would show him some large trees. So he came down with us and we went to Boonville and got in Senator Hemenway's automobile and I introduced him to a pawpaw tree six feet and a half in circumference at the ground, and five feet in circumference three feet from the ground. So the

chair takes some pleasure in having been able to show the things that were promised. Let us hear from Mr. Riehl.

Mr. Riehl: I think you folks are very unfair to me. You have said everything I wanted to say before you called on me and I really don't know what else I can say. I had in mind what Professor Smith has been saying to me, and what some of you people have already said, that it is time for you people here to wake up. You don't know what you have got. You are like people in many other sections of the country, they don't appreciate what they have at their very doorways. If I were a young man, I would come here and plant pecan and walnut trees, but I am too old now to make such changes. In a few years you may remember what I have said. The walnuts are as profitable as anything else, and much more so than any farm crop you can grow. Nothing will produce as much value and with as little trouble as nut trees. I am convinced of that.

Professor Smith: If they would follow your suggestions they would soon have another Garden of Eden.

The President: Professor Smith has reminded us that the crops in the Garden of Eden were purely tree crops, and they grew without effort. But after the fall Adam and Eve had to go out and cultivate the soil and raise corn. Probably in that garden they had pecans and walnuts. I believe that is his theory and it may be good.

Professor Smith: O, beg your pardon, that is in the book of Genesis. The text describes nothing whatever except trees, and then Adam fell and had to dig in the ground and make his bread by the sweat of his face.

Mr. Potter: Is the tree of knowledge the pecan tree?

The President: I don't know. Can any one else say?

Professor Smith: My remarks on the Garden of Eden were brought out by what our President said, but I have published others that are not very lengthy and you can buy them.

The President: Let's hear from Mr. Lockwood.

Mr. Lockwood: Dr. Knapp wants me to expose my ignorance and tell you the crimes I committed and intended to commit. It was about three years ago that we purchased a little over a thousand acres in Gibson County, near Grayville, and about three hundred and fifty acres of it were in timber. We decided to clear up as rapidly as possible all the forest land and cultivate it in corn. Now comes the crime which Dr. Knapp wants me to expose and I am going to confess it. We deadened probably a hundred of as fine

pecan trees as you ever saw, from six to eighteen inches in diameter, and Dr. Knapp heard about it and visited our farm, and it was on his account principally that we quit cutting the pecan trees. Now if anybody else cuts them we have them arrested. We have the second best orchard in Gibson County. I have joined the association and came here to get a line on you and I have got a good many good things by coming. I would like to have you visit our farms. We have some very fine trees to see and I will also give you something to eat, because I am the chief cook. I want to emphasize the remark one member made that it is a great work these men are doing. You get that impression when you come to the meeting, and it shows great sacrifice and love for their fellow men.

The President: That is very good, Mr. Lockwood. Now Dr. Knapp will tell us what he thinks.

Dr. Knapp: I know very little about pecans but I was interested in Mr. Lockwood's trees because he had a magnificent pecan orchard, possibly five hundred trees, and they were contemplating having the trees cut down because they thought they were in the way of the cultivation of the land for corn. This is not the case because the pecan tree goes away down deep for water and is not like the surface root trees. I have seen large wheat fields in the same location with large pecan trees in them, and men have told me that they produce just as much per acre on the land where the pecan trees are as where there are no pecan trees. I went to see Mr. Lockwood and took him what little literature I had on the pecan industry and promised to send him some more, and insisted that he read it before he destroyed his trees. He kept his promise and I am glad to see that he has taken an interest in the pecan industry.

The Chairman: You are a real benefactor, Dr. Knapp, and entitled to great praise.

Professor Smith: While we are distributing things gratis I want to make a little statement in the same vein as a previous speaker. He points out the work that a few enthusiasts are doing. Most of the things worth while are done by the people who never get any credit in a financial way. You will find the things that count are started and done by that live force of men that work for the fun of working with no promise of reward. Why should Mr. McCoy or Mr. Reed come down here and tell us how to bud trees, and what varieties to use? It is plainly a labor of enthusiasm and love. I want to express my particular appreciation of the work done by Mr. Thomas P. Littlepage. We hear from Indiana through Mr. Littlepage. On every occasion when we get in trouble and want

bud wood, along he comes and helps us out. He seems to have all kinds of equipment for keeping it or he can always go to a pecan tree and get it. We never hear of the trouble or expense. He spends money as if he had a barrel of it. He has spent lots of money trying to get the people to know there was an Indiana pecan. We also know that Mr. McCoy and Mr. Wilkinson and others too numerous to mention have lost thousands of dollars and have worked long and hard to get this industry started. The industry needs enthusiasm and no end of work. It means work to get out and hunt trees and bud wood and these men are entitled to lots of credit for their efforts.

THE PRESIDENT: The chair appreciates that compliment but he is hardly entitled to so much praise. However, all the efforts we have made to create interest in the pecan have been well spent. We have had lots of trouble in getting bud wood and if it had not been for Ford Wilkinson we never would have gotten anywhere. He is the best climber in the country. He has gone at all times and under all conditions and has done more real hard work than all the rest of us put together. He always climbs the trees. The Major tree is about fifty feet to the first limb. We couldn't have gotten along without him. And Mr. McCoy is entitled to great credit. The first time I ever saw the Posey nut Mr. McCoy brought some to my home in Boonville. That was a number of years ago. He first stimulated Mr. Brown to put the Warrick pecan on exhibition. As I grew up I knew where these pecan trees were and who kept a dog and what time he got up and there were not many pecan trees then I would not attempt to climb, but I wasn't as large as I am now. Of late years Mr. Wilkinson has done more than I have along that line.

MR WILKINSON: I appreciate what you say of me but it takes all kinds of people to make a world and to grow pecan trees. I have tried to do my part but without the others I couldn't have done anything. We expect to continue at the work as long as there is any success in sight at all and hope soon that some of the hard part will be over.

THE PRESIDENT: Before we leave that subject I want to say that a few years ago some of us who had begun to think we knew something about the pecan and were quite sure of our ground, induced Mr. C. A. Reed of the Department of Agriculture to come down here and make some trips through these woods and tell us what he knew, or what he thought of these pecans. We gave him all the

facts we could, and the suggestions he made started us on the right track as to the varieties to propagate.

THE PRESIDENT: The boat is ready, but before we go I want the report on nominations. I want the officers elected in Enterprise.

DR. DEMING: I would like to say this before we proceed to the election of officers. There has been some talk among us that it would stimulate interest in our work and meetings, and would enable us to confer honors on more people, and more members who deserve such honors, if the term of the presidency were limited to one year. There has been no rule about it but our first two presidents have each held office two years. They have been re-elected to office as a matter of courtesy and appreciation of their efforts. If from now on we limit the term of the presidency to one year I think it would be better. We think it would be desirable to make the rule that the President shall not be eligible for immediate re-election, that is, he shall not follow himself. I mention it so that if this rule is adopted in the revision of our constitution and by-laws the person who is about to be elected President, and the members of the association, will understand that there will be nothing personal about such action.

THE PRESIDENT: In connection with that I should like to say that the present President has at different times heard suggestions of that kind made, and I am glad you mentioned it. I wasn't fortunate enough last year to be at the meeting, as I had to be in St. Louis to help try a case before the interstate commerce commission, or I should have brought that up then.

Dr. Morris is absent and Professor Close is the next on the committee on nominations. Professor Close, will you report?

PROFESSOR CLOSE: I did not know I was the next member and Dr. Morris did not leave any data with me. However we discussed it and decided to recommend the election of J. Russell Smith for President, Mr. W. C. Reed for Vice-President and Dr. Deming for Secretary and Treasurer.

THE PRESIDENT: Any remarks on the report of the nominating committee? If not, those in favor of adopting the report, thereby declaring the officers named elected, make it known by rising. (Vote taken.) Contrary by the same sign. Your officers for the next year will be Dr. J. Russell Smith, President, W. C. Reed, Vice-President, and Dr. W. C. Deming, Secretary and Treasurer. I congratulate the association.

Meeting adjourned.

Meeting called to order at 8:30 P. M., at Evansville, Indiana.

PROFESSOR SMITH: The members of this association have always got to be on the lookout for good parent trees of any and all varieties of nuts. I think, however, there is a shortage of information in the matter of walnuts. I have talked to a number of persons and it is the general opinion that we want to know, and know quickly, more about parent trees of the Persian walnut. I therefore move that the chair appoint a committee to give this matter particular attention during the next twelve months and report at the next annual meeting.

(Seconded and carried)

THE PRESIDENT: The chair appoints the incoming President, C. P. Close and C. A. Reed.

The next is the question about the place of the next meeting. It occurs to the chair that it might be desirable to leave that to the executive committee. But that is a matter for the association to decide and the chair will entertain motions or suggestions.

MR. C. A. REED: I was going to move that it be left to the committee. I know from past experiences that is the best course to pursue.

(Seconded and carried.)

COLONEL VAN DUZEE: I would like very much to extend a cordial invitation to the members of this association to meet with the National Association at Thomasville, Georgia, in October. We have a program full of merit. Our meeting will be held in the heart of the nut planting area where all the pecan planting has been done in the last few years. We have several fine orchards in the immediate vicinity and matters of general interest will be discussed. We would be glad to have anybody that can meet with us, and if you have friends interested in nut culture we will be glad to have them.

THE PRESIDENT: It is unnecessary to say that the South has forged ahead of us in pecan culture, and she not only has great pecan orchards but she has great men who have done this work and they will be at the meeting of the National Nut Growers. I have had the pleasure of attending some of these meetings and I can say to the members here it will be well worth their while to go down there.

Is there any further business? If not we will have Colonel Sober's paper, after which the pictures will follow.

PROFESSOR SMITH: I am sure after hearing Colonel Sober's lecture, and seeing his pictures, we will want to ask him some questions.

I know that Colonel Sober has worked out an unique method in the root system, and I wish he would tell us about it.

COLONEL SOBER: The slides I have will show that.

THE PRESIDENT: Is there anything else?

MR. DOAN: How does Colonel Sober take care of the blight?

COLONEL SOBER: In answer to that I will say that in 1909 I discovered the blight on some trees, just a speck, and I took my knife and cut it off. That is my best method and then you are sure of it.

THE PRESIDENT: Are there any further questions?

MR. DOAN: Are all his trees Paragon?

THE PRESIDENT: I think they are. The Secretary will read Colonel Sober's paper.

The Secretary here read extracts from the preface and introduction to Fuller's book on nut culture, prepared by Col. C. K. Sober, with personal interpellations, as follows:

I believe that the moment is opportune for advocating an effort to cultivate all kinds of edible and otherwise useful nut-bearing trees and shrubs adapted to the soil and climate of the United States, thereby inaugurating a great, permanent and far-reaching industry. We are spending millions for imported articles of every-day use which might easily and with large profit be produced at home, and in many instances the most humiliating part of the transaction is that we send our money to people who do not purchase any of our productions and almost ignore us in commercial matters. I am not referring to products ill-adapted to our climate, nor to those which, owing to scarcity and high price of labor, we are unable to produce profitably, but to such nuts as the walnut, hickory, butternut, pecan and chestnut which we can raise as readily as peaches, apples and pears. There certainly can be no excuse for the neglect of such nut trees on the score of cost of labor in propagation and planting, because our streets and highways are lined and shaded with equally expensive kinds, although they are absolutely worthless for any other purpose than shade or shelter, yielding nothing in the way of food for either man or beast. Can any one invent a reasonable excuse for planting miles and miles of roadside trees of such kinds as elm, maple, ash, willow, cottonwood and many other similar kinds, where shellbark hickory, walnut, butternut, pecan and chestnut would thrive just as well, cost no more, and yet yield bushels of delicious and highly prized nuts, and this annually or in alternate years, continuing and increasing in pro-

ductiveness for one, two or more centuries. The nut trees which grow to a large size are just as well adapted for planting along roadsides, in the open country, as other kinds that yield nothing in the way of food for either man or beast. They are also fully as beautiful in form and foliage, and in many instances far superior to the kinds often selected for such purposes.

The only objection I have heard of as being urged against planting fruit and nut trees along the highway is that they tempt boys and girls as well as persons of larger growth to become trespassers. I find this only applies to where there is such a scarcity that the quantity taken perceptibly lessens the total crop. But where there is an abundance either the temptation to trespass disappears or I fail to recognize the loss. As we cannot very well dispense with the small boy and his sister I am in favor of providing them bountifully with all the good things that climate and circumstance will afford.

On my farms in Irish Valley, Northumberland County, Pa., I have planted a Paragon chestnut tree every forty feet along the public highways and driveways making a total of 769 trees. These trees range in age from four to ten years old.

A mile in this country is 5,280 feet, and if chestnut trees are set forty feet apart, which is allowing sufficient room for them to grow during an ordinary lifetime, we get 133 trees per mile in a single row. Two rows may be planted, where the roads are wide enough, one on each side, and then we get 266 trees per mile. I can estimate the crop when the chestnut trees are twenty years old at two bushels per tree, or 532 bushels for a double row per mile. At the moderate price of $4 per bushel, we would realize $2,128 for the crop on a double row, with a fair assurance that the yield would increase steadily for the next hundred years or more, while the cost of gathering and marketing the nuts is no greater, and in many instances much less, than that of the ordinary grain crops. At the expiration of the first half century one half of the trees may be removed, if they begin to crowd, and the timber used for whatever purpose it may best be adapted. The remaining trees would probably improve, on account of having more room for development.

The chestnut thrives best in light, well drained soil, and those containing a large proportion of sand or decomposed quartz, slate and gravel; but it is rarely found, nor does it thrive very well, in heavy clays or limestone soil where the limestone rock comes near the surface. It is true that chestnut groves, and sometimes extensive forests, are found on hills and ridges overlying limestone, but a careful examination of the soil among the trees will show that it is

a drift deposit containing little or no lime. I find in Pennsylvania the chestnut tree grows from the banks of the Susquehanna River to the tops of the mountains.

In planting the chestnut tree it should never be planted any deeper than it was in the nursery rows. If planted any deeper it is certain death to the tree, as I find that the earth placed around the trees above where it was in the nursery rows scalds and destroys the tree. Here is where the great mistake is made in planting out the chestnut tree, and this I have found out by practical experience. It is far better to plant it one inch less than it was in the nursery than to plant it an inch deeper.

There has been a steady increase in the demand for, and a corresponding advance in the price of all kinds of edible nuts during the past three or four decades, and this is likely to continue for many years to come, because consumers are increasing far more rapidly than producers. Besides, the forests, which have long been the only source of supply of the native kinds, are rapidly disappearing, while there has not been, as yet, any special effort to make good the loss by replanting or otherwise. The dealers in such articles in our larger cities assure me that the demand for our best kinds of edible nuts is far in excess of the supply, and yet not one housewife or cook in a thousand in this country has ever attempted to use nuts of any kind in the preparation of meats and other dishes for the table, as is so generally practiced in European and Oriental countries.

The question may be asked if the demand is sufficient to warrant the planting of the hardy nut trees extensively along our highways or elsewhere. In answer to such a question it may be said that we not only consume all of the edible nuts raised in this country, but import millions of pounds annually of the very kinds which thrive here as well as in any other part of the world.

Where farmers want a row of trees along the roadside, to be utilized for line fence posts, they cannot possibly find any kinds better adapted for this purpose than chestnut, walnut, hickory and pecan. In a few years they may yield enough to pay the taxes on the entire farm, the crop increasing in amount and value not only during the lifetime of the planter, but that of many generations of his descendants.

This appeal to the good sense of our rural population is made in all sincerity and with the hope that it will be heeded by every man who has a spark of patriotism in his soul, and who dares show it in his labors by setting up a few milestones in the form of nut-bearing trees along the roadsides—if for no other purpose than the present

pleasure of anticipating the gratification such monuments will afford the many who are certain to pass along these highways years hence.

It is surely not good policy to enrich other nations at the expense of our own people, as we are now doing in sending millions of dollars annually to foreign countries in payment for such luxuries as edible nuts that could be readily and profitably produced at home. There need be no fear of an overproduction of such things, no matter how many may engage in their cultivation.*

Colonel Van Duzee: I have no questions to ask, but as I am going to be obliged to leave the session before the close of the lecture, I should like to express my appreciation of the paper which has been read and make a remark or two. I am so heartily in sympathy, in this commercial age, with some of the thoughts expressed there, that it is a pleasure to listen to a paper which takes into consideration something a little beyond, and the idea of planting trees by the roadside for the benefit of humanity, is of too much importance to be overlooked. I could go on at great length along this line, but as I have not time I just wanted to express my appreciation before I have to go.

The President: Has anyone else any suggestions or any general business?

The Secretary: There has been no discussion at all of the filbert, I think. That is a nut that is possibly going to be of great importance in the future. I think it was Mr. Doan who asked me about the filbert and there might be someone here who could give us some information about its possibilities. Perhaps Mr. Reed could tell us something about it.

Mr. C. A. Reed: Well, I am glad the subject has been brought up but I would rather listen than try to talk. As Mr. Littlepage made clear in his paper yesterday, there has been considerable effort in the eastern states towards the introduction of the filbert, but almost uniformly such attempts have met with failure. About two weeks ago some of us visited Dr. Morris's place and while there we were shown some large European filberts, ten to twelve feet high, bearing heavily. These were not suffering from the effects of the blight at all so far as we could see, and they were right in the district where the native northern filbert is one of the most common of

*Note by the secretary: At the time when Fuller wrote his excellent book, the chestnut blight, as at present known, had not been observed, although he makes an interesting reference to some disease of the chestnut, of unknown nature, at one time destructive to the trees in the Piedmont region. The Northern Nut Growers Association does not recommend the planting of the chestnut in any region where the chestnut blight, *Endothia parasitica*, is prevalent. With this exception the association is heartily in sympathy with the sentiments expressed by the writer.

C. A. REED

In charge of Nut Culture Investigations, United States Department of Agriculture

the wild plants. It was quite a revelation to me to see the native filbert or hazels bearing so heavily. Everywhere we went we saw low bushy hazels not over two feet from the ground loaded with immature nuts. I thought there was an opportunity for some nut enthusiast to canvass that territory, and find the best individual plants for propagation. The filbert, it seems to me, offers an unusually inviting field, and unless I am greatly mistaken there is a great field for exploration. Dr. Deming lives in that same section, and he tells us that on his farm the hazels are even more common than at Dr. Morris's place. Dr. Morris agrees with us that there is a fine opportunity for searching for the best varieties. He has done it and has found, I believe, one which he thinks is especially fine. I would be glad to hear from any one else about these nuts.

Mr. Riehl: Mr. President, I have made a little observation of the European and I don't think it will count for very much. I know of trees that were planted in one of our experiment stations. I last saw them three or four years ago and they were twelve or fifteen feet high and bearing very heavy crops. I saw no disease of any kind but it was in the city of Alton and I don't suppose there is a native hazel within miles of it. That may be why they were bearing so well and were exempt from disease. I haven't seen those trees for the last four years and what has happened to them I don't know. I intend to go and see what has become of them.

The President: Mr. Doan, what is your especial interest in the hazel?

Mr. Doan: I think it offers great possibilities. The different species that we have tried show that. The fact that it grows freely, even though certain branches of it have the blight, which does not at once destroy the whole bush, and the fact that it bears freely and abundantly, I think are points in its favor. A great many persons couldn't wait eight or ten years for a nut tree to bear but could wait a much shorter time. I think this is one good point in favor of the hazels.

The President: There is no doubt that the hazel offers a very excellent opportunity for study and investigation. There are many varieties of the native hazel that are very fine and it seems to me that therein lies a field of work for this association. There is no information to the productive nut grower of more value than the facts as to what these nuts will do, how they can be produced, how quickly they bear, and what they are worth. We have very little reliable information about the English walnut. When we listened to Mr. Reed last night we were forced to the conclusion

that as yet we know nothing about it. There are a few apparently promising English walnut trees throughout the North but there are many things to be taken into consideration before you can recommend those for propagation. It seems to me the hazel offers a field of considerable importance. Has any one else any suggestions to offer?

MR. POTTER: This hazel proposition interests almost every member of the association. It seems to me as if we might get at something more definite and instructive and I move that the chair appoint a special committee to investigate the hazel, and report at the next meeting.

A MEMBER: I second the motion.

THE CHAIRMAN: It has been moved and seconded that the chair appoint a committee of three to investigate the hazel or filbert, and report at the next meeting. Are you ready for the question?

MR. RIEHL: I hardly think that will do any good. I believe there is a field where good work can be done but I doubt whether the chair or any one else is able to appoint a committee that can find out much that will be of value between now and our next annual meeting. There are so few superior hazels. I tried for many years to find a native hazel that is worthy of planting. I have heard of some but have been unable to get them. I heard of one and had it promised to me but he has forgotten it, I guess, and I never got it. I know of another that is said to be very good, but the man that has it won't let anybody have it unless he gets five hundred dollars, and there is no man willing to pay that on his say-so that it is a good thing. So we have got nothing to go on for such committee to make a report on. A much better plan would be for this association to offer a prize of a certain sum of money to any one who will report a superior hazel. Let that get in the papers and be talked of so the boys and girls will hear of it and they will contend for the twenty-five or fifty dollars. There are no doubt such fine hazels but the trouble is to find them. I think the best way would be to offer a reward and let them be brought to us. In that way we can accomplish something, but to appoint a committee when we have nothing to go on will do no good.

THE PRESIDENT: There is a great deal in the suggestions of Mr. Riehl. It has been noticed by all of us in nut culture that the individual opinion of the man who has seen only his tree or bush is perhaps not worth much. That is why the data we have on the walnut is unsatisfactory. So much of it comes from the man who

has seen only his tree, and does not know what a first class bearing tree is like. The same difficulty would arise, to some extent, in your suggestion, Mr. Riehl, as to offering the prize. That is perhaps one of the best methods to stimulate interest but there is this difficulty in the way, that the nuts must be gathered, and the tree be investigated before it could be properly authenticated. I have had people tell me they have seen pecans from certain trees, that long (measuring on finger). There never was a pecan grew in the world that long. The question before the house is the appointment of this committee. Is there any further discussion? If not those in favor of it make it known by rising. (Two.) Those opposed make it known by rising. (Seven.) The motion is lost. Is there any further business? If not we will stand adjourned *sine die*.

APPENDIX

THE HISTORY OF THE PERSIAN WALNUT IN PENNSYLVANIA

J. G. Rush, West Willow, Pennsylvania

The history of the Persian walnut in Pennsylvania goes back several hundred years. Seed nuts only were brought here by the early German settlers, as steam navigation was unknown at that period. From this mixture of seed from Europe, we have at this time a few varieties worthy of favorable mention. In this connection I will give you my brief history or experiences and observation for the last twenty-nine years.

In 1886 I bought two seedling trees from a local nursery regardless of name or variety at thirty-five cents each. These two trees received equal treatment in culture for ten years, when the so-called Rush tree produced two bushels of fine developed nuts. The other tree about forty feet away has not produced two bushels from the time it was planted to the present date.

The productiveness of the Rush induced me to think, and to investigate the great difference in these two trees. I finally found the Rush to be a simultaneous bloomer whereas the other was just the reverse.

Being a member of the State Horticultural Association I exhibited these nuts from time to time when finally other members became interested in nut culture. Mr. John Engle of the Marietta Nurseries advised me to plant seed from this particular tree and raise seedling trees for sale. I finally did on a small scale only. But I soon found in the young seedlings a taint of black walnut blood, which discouraged me for a further continuance. Later I had correspondence with J. F. Jones, then of Monticello, Fla., who had specialized in the propagation of all nut trees. In 1903 scions were sent to him, and returned as budded trees in 1905. and are now a living monument to the memory of the first propagator of the Rush variety.

The Pennsylvania state nursery inspector first called my attention to the Hall variety in Erie County, Pa., after which a lively correspondence followed and sample nuts were exchanged. In 1910 Mr. J. F. Jones and myself were to see this tree, in order to

get its life history. It was said by Mr. Hall that the tree was planted by the early German settlers about forty years ago. The Hall variety is very catchy to the eye on account of its large size. Through the kindness of Mr. Hall we were allowed to cut a few buds, which are bearing trees now at West Willow.

The Holden came first to my attention about four years ago in the New York State Horticultural Association Report, after which a lively correspondence opened and sample nuts with the Rush were exchanged which finally led to the propagation of this prospective variety.

The Nebo is a variety the history of which I traced back to about seventy-five years ago. It was planted by an English iron-master by the name of McCreary. It is said that he gave lodging to a tree agent, whereupon he received this tree as compensation.

The Burlington from Burlington, N. J., is of the Alpine type, and is of great size.

The Lancaster was first called to my attention a year ago. It is said the tree, not the seed, was brought from Germany. This variety is worthy of extensive cultivation, is however also of the Alpine type and very prolific.

In connection with the varieties just mentioned we have also the French varieties, such as the Mayette, Franquette, Cutleaf, Alpine and Parisienne. The French varieties are not tried out in respect to their dependability for the Atlantic coast. They however show hardiness equal to any other variety grown in Pennsylvania.

As regards the late vegetating habit of some of these varieties enabling them to escape late spring frosts, I see no advantage whatever, as Jack Frost is a privileged character and makes his appearance regardless of time or place.

With the limited efforts I have made thus far in the dissemination of the Persian walnut, I am absolutely confident that the work has just commenced. There will yet be varieties discovered which will compare favorably and may surpass those we have already listed. The best territory to work in I find is the German settlements. They always were noted for their seed distributions in the early history of Pennsylvania. In justice to these frugal people, the Persian walnut should be called The Dutch nut. But the English were the great importers of these nuts and hence the name English walnut. The Germans today as they visit their Fatherland invariably bring a few nuts or trees with them, which keeps up the supply. Of course not all these seedling trees are

true to the variety desired. But they say they come from the Homeland, which gives them great contentment.

In the dissemination of these interesting nut-bearing trees I am safe in saying I have visited hundreds of them and mostly single trees of very little importance. The principal complaint is that when the nuts are as large as grapes they drop off from some unknown cause. This is all for the want of proper cross pollenization. The public in general is now getting educated to the importance of planting grafted or budded varieties of known merit, which is attested by the large plantings of the last several years.

My limited experience with grafting large nut trees is that it is not practicable, from the fact that the lower limbs outgrow the grafted ones and eventually smother them and cause them to die out, leaving the tree in a disfigured condition. The better way is to plant several trees of a good pollenizing variety near one another to get best results in bearing.

In this brief history of the nut industry of Pennsylvania and adjacent states, I have said nothing in regard to propagation and culture, knowing that some one else will take up that subject in detail.

Horace Greeley in his prime of life said: "Young man, go west."

The Northern Nut Growers Association says: "Young man, plant a nut tree."

A COMPARISON OF NORTHERN AND SOUTHERN CONDITIONS IN THE PROPAGATION OF NUT TREES

J. F. Jones, Lancaster, Pa.

I shall not try to cover the whole subject of propagation or describe methods of budding and grafting, as these will be covered by others and we are to have demonstrations of budding and grafting, which are far ahead of any descriptions that can be given. I will try to compare conditions in the North and South and give some of my experience with the problems that have confronted us.

We have been able to get very satisfactory results with the pecan, either by budding or grafting, under northern conditions. With good scions and good stocks we have been able to get nearly, if not quite, as good results in Pennsylvania as we were able to get in Florida or Louisiana. The growth of the tree is also quite satisfactory. From dormant buds on good stocks we are able to get a growth of four to six feet the first year in the nursery and six to seven feet is not unusual. The growth is also quite stocky and altogether very satisfactory. Any of the methods of propagation as practiced on the pecan in the South are successful in the North, but budding by the patch method has given us the best results. Grafting is quite successful so far as the live or stand is concerned, but, on account of our shorter growing season, the growth is not nearly so satisfactory as that of the dormant bud which, being set the previous summer, is ready to start quickly into growth in the spring and gets the full benefit of our shorter growing season.

The shagbark hickory is essentially a northern tree and can only be propagated satisfactorily in the North. In Florida and Louisiana we could graft the shagbark on pecan stocks with fairly satisfactory results, so far as the live or stand was concerned, but the tree did not take kindly to the climate of the Gulf Coast and made little growth, a number dying out altogether the second and third years after being grafted. We have never gotten very satisfactory results from grafting the shagbark with scions taken from old, bearing trees, but with good scions from young thrifty trees, the shagbark may be grafted with fairly satisfactory results in the northern states. From the nature of the growth, it is not practical to bud the shagbark by the annular or patch bud methods as practiced so

satisfactorily on the pecan, but last season (1913) in an experiment we got good results from ordinary shield budding by taking scions from a tree that had matured and ripened its growth up early and setting the buds on young, sappy growth of the pignut hickory, *Hicoria Glabra*. The scions from which these buds were taken were cut to test patch budding on the shagbark and when it was found that the growth had hardened and the bark would not peel, the buds were cut and inserted by ordinary shield budding, as practiced on the apple, peach, etc. This experiment was made with little or no hope of success, so that my surprise can well be imagined, when the wrapping was removed and it was found that every bud had united with the stocks! These buds have made better growth the present season than have the grafts set the past spring, as might be expected. This may be a freak and we may not be able to again duplicate the results, at least in more extensive practice, but I am inclined to think that we will, under similar conditions. The shagbark, without any manipulation, ripens and hardens up its growth early in the season and it would appear that these conditions could easily be duplicated, at least in average seasons. Young stocks of either the pecan or pignut hickory hold their sap much later than does the shagbark and are in good condition for budding after the shagbark is dormant. We have practiced this method on the chestnut for several years with very satisfactory results. The chestnut may be budded almost as easily as the apple or pear, and with nearly as good results, by ordinary shield budding, by taking scions for budding from an old bearing tree which has matured and ripened its growth up early and setting the buds on young, sappy seedling stocks growing under cultivation in the nursery. The paragon chestnut, especially, ripens its growth up very early when the tree is carrying a good crop of chestnuts, and there is a month, in average seasons, when buds may be taken from it and set on young stocks in the nursery. This condition might be brought about on younger trees from which buds are to be taken by withholding nitrogenous fertilizers and cultivation, or, if necessary, by root pruning. Root pruning should not be too severe as a sudden check on the growth in the growing season might interfere more or less with the storing up of "starch" or "dormant plant food" in the scion. Any condition or conditions that will serve to induce early maturing and ripening of the wood growth on trees from which buds are to be taken will be satisfactory, and by using nitrogenous fertilizers and liberal cultivation on the stocks to be budded, they may be kept in good condition of sap well into September in average seasons.

grafted at the proper time we were able to get good results without any manipulation of the seedling stocks. All that we ever did there was to remove the new growth occasionally to hold the stocks in good condition for grafting and prolong the grafting season, and it was always questionable whether this was a necessary precaution. My idea in keeping the new growth off the stocks till the grafts were set was not to control the sap flow, but to prevent, if it were possible by this means, the exhaustion of the stored up "starch" in the stock, by the new growth. In the northern states, the sap in the walnut stocks, and perhaps to some extent in other nut tree stocks, is inclined to come up in the spring with a rush. Some seasons at least, even before the buds push into growth, when the stocks are cut off for grafting a large number "bleed" or run sap very freely and this may continue several days, flooding and injuring the scion and exhausting the vitality of the stock. This condition was especially noticeable the past spring, due presumably, to the lateness of the growing season. Making provision for the exit of the surplus sap was usually sufficient in the lower south and, we believed, would be farther north, but with the stronger flow of sap this is not sufficient in the northern states, at least some seasons. An examination of grafts, set on stocks which have bled freely after having been grafted, shows that the stock callouses very slowly, if at all, and the scion, unless it be of very heavy, solid wood, becomes dark colored and sour and the wood soon dies in the cleft, although the scion above this point may remain green for weeks. I am not able, at this time, to give any specific remedy for the correction of this trouble for the reason that I have not worked it out to my own satisfaction as yet, but now that we understand the trouble better, I feel sure that we will be able to correct it in the manipulation of the stocks before they are grafted. Keeping the new growth off the stocks may be found to be sufficient in most seasons, if the grafting is done rather late, but I am of the opinion that a rather severe cutting back of the stocks a few days before they are grafted, if the grafting is done early, will be found the best practice. For later grafting, my opinion is that two or three cuttings, say a week apart, will be better. Root pruning, where it can be practiced to advantage, will be found more effective still. I have never known newly transplanted stocks or those which had the tree digger run under them, to bleed freely when grafted, and we have sometimes gotten a good stand of grafts on such stocks, but such stocks may not always have sufficient sap for the best results in grafting, if they have been recently transplanted or root pruned. Fall planted

As a matter of experiment, I want to try budding both the pecan and walnut by this method the present season, but I don't expect any results from walnut buds set in this way. For the information of those who may wish to try this method the present season, I will say that we cut the shagbark buds a little heavier than we cut apple or pear buds. The wood was left in the bud. The bark on the stock was split and the buds inserted just as in any other shield budding. The buds were wrapped very firmly, with waxed muslin, just as we wrap patch buds.

Our success with grafting the English or Persian walnut, under northern conditions, has been variable and not very satisfactory. With good scions and good stocks and other favorable conditions, we have sometimes gotten over 90 per cent to grow, but the stand is more often much below this and the present season we did not average over 25 per cent. The fact that we get good stands of grafts when all conditions are right, is not only encouraging but demonstrates that the English walnut can be grafted under eastern or northern conditions with at least a fair degree of certainty as to results, just as soon as we learn the causes of our failures and are thus able to apply the remedy. Perhaps the greatest drawback to the successful grafting of the English walnut is the difficulty of obtaining good scions. The annual growth of the walnut is much more pithy than that of the pecan or shagbark, and for this reason, only a comparatively small portion of the growth is available for grafting purposes if we are able to select scions that will give the best results. Like the pecan and shagbark, the two-year wood makes the best scions for grafting, provided that the wood has good buds on it, but under our conditions those buds that lie dormant are usually shed off during the summer and few good buds remain that will start quickly into active growth. It is true that adventitious buds will often form where these buds have shed off, and these will push into growth if the stock is kept free from sprouts, but usually too late in the season to make good trees, and keeping the seedling stock free from sprouts when it should be in leafage is more or less weakening and injurious and the grafts, starting into growth late in the season, do not mature and ripen their growth up properly before frost and are quite likely to be injured by early November freezes, unless they have some protection. To graft the English walnut with unvarying and satisfactory results, under northern conditions, we must not only have good scions and good stocks, but we must control the sap flow in the stocks. In Florida and Louisiana the sap came up more gradually in the stocks in the spring, and when

or root pruned stocks would probably give the best results, as the sap would probably come up more gradually in the spring and, while the flow would probably be sufficient for the best results, it would not flow freely enough to injure the scion or stock.

We have not experienced any serious difficulty from an extreme flow of sap in pecan stocks, either in the North or South, but we have had grafts set on the pignut hickory fail from this cause. The English walnut may be budded with fair to good results, by the patch method, by selecting good buds on the best matured, round growth, but to propagate the tree economically and satisfactorily it is desirable to both bud and graft, otherwise both stocks and scion wood are wasted.

TOP-WORKING LARGE WALNUT TREES

W. C. Reed, Vincennes, Indiana

In top-working large native walnut trees to the Persian or English walnut, the first operation is to cut the trees back severely. This should be done while the trees are dormant, preferably in February or early in March. Cut them back two feet or more above where you wish to graft, then cut again to where you want them. This will avoid splitting. Usually we cut back to where the limbs are from two to four inches in diameter. We have cut some back that were six to eight inches with good results. However, limbs this size require careful attention to avoid decay as it takes so long for them to heal over.

Scions for Grafting

Scions for grafting should be cut while perfectly dormant and packed in damp moss or sawdust, being careful not to have it too wet. Paper line the boxes and place in a cool place. Cold storage is much better. Scions cut during the winter and placed in cold storage will come out in good shape for grafting in May, or budding during July or August. Where there is danger of the wood being injured by cold weather it would be well to cut scions in November, before severe cold.

Time for Grafting

Wait until the new growth is well advanced or nearly in full leaf, which is about May 1 to 10, in this latitude.

Methods

Use either the wedge graft or the bark graft. We have had equally good results with each. If any difference it is in favor of the side or bark graft which we prefer because it does not split or mutilate the stock, there is not the chance for decay, and the wounds heal over much quicker. On limbs three to four inches in diameter put in three to four grafts.

Cut the stubs back one to two inches below where they were cut when dormant so you may have a fresh clean cut. Pare the rough bark off until you have a fairly smooth surface for three inches below where the limbs are cut off.

Side or Bark Grafting

For side or bark grafting split the bark with a sharp knife for about two inches where the graft is to be set. Cut your scions with about two buds. Slope the scion all from one side with a long slope so it will fit well to the wood or cambium layer; then trim off a little of the outer bark on the outside lower edge of the scion, just enough to expose the cambium so it will come in contact with the inner side of the bark on the tree.

Wedge Graft

If the wedge graft is used, take a long bladed knife (a corn knife will do) set it sloping on the cut off stock and make a clean cut through the bark first so it will split straight, then raise the handle of the knife and drive the blade into the wood, splitting it as deep as needed, depending on the size of the scion and insert a wooden wedge made from some hard wood. An old broom or hoe handle is good, tapering the wedge from both sides, leaving it thick in the center so it will come out easily after the graft is set by simply tapping lightly from first one side and then the other. In cutting the scion slope from each side with a long slope to fit the split in the stub. The outer edge of the scion should be somewhat thicker than the inner edge so that when the wedge is taken out it will be held firm. Be very careful to see that the cambium of the scion and tree meet on each edge of the scion. Pack all large cracks with tissue paper and wax thoroughly.

Waxing, Tying, Bagging

As soon as the grafts are set, cover the entire wound with grafting wax, being careful to cover the top of the stub well and the sides as far down as the bark is split, and the upper end of the scion. Then place a paper sack over the stub to prevent evaporation and leave this on until the scions start into growth. We do not use any tying material on large limbs because the bark is thick enough to hold the graft in place. However, on smaller trees it will be important to wrap the grafts well.

Grafting Wax

The best grafting wax we have found is composed of the following:

Four pounds resin, one pound beeswax, one-half pint linseed oil and one tablespoon of lampblack. Melt all together and apply with a paint brush, being careful not to have the wax too hot.

After Care

After new growth starts watch it closely every week or ten days and keep all suckers removed until the scion starts into growth. Wherever grafts fail to start the suckers may be left to grow for budding later.

Budding Large Trees

Cut back early the same as for grafting, cover all cuts with grafting wax, let all sprouts grow until time to bud, which is usually August 1 to September 1. Thin out the small, weaker sprouts and bud three or four of the largest ones, setting the bud four to six inches from where the sprout comes out of the stub. Use the patch bud, wrap carefully with waxed cloth, using muslin dipped in melted beeswax, the strips of cloth three-sixteenths to one-fourth inch wide. The following spring, about March 1, cut the sprouts back to about three inches above the bud, remove all other sprouts when new growth starts and keep all suckers removed.

Supports

At this time you will need to put up slat supports to tie the buds to. Take slats one by two inches and twelve feet long. Nail these to the sides of the limbs so they will extend six to eight feet above. Keep buds and grafts tied up every week or ten days during the growing season.

It has been our experience that budding is preferable. However, grafting in the spring and then budding in August gives you two chances the same season.

This same method applies to the pecan and hickory as well as the walnut and if the work is carefully done you will surely be well paid for your work.

INTEREST IN NUT GROWING IN THE INTERMOUNTAIN STATES

Dr. L. D. Batchelor, Utah Agricultural Experiment Station.

The marked increase in the interest in nut growing throughout the intermountain states is shown by the numerous inquiries on this subject which are directed to this office. There have been very few plantings of commercial orchards, but on every hand there is an interest shown in using nut trees for shade trees. The hardy varieties of Persian walnut are being planted more each year to ascertain the most promising sorts for commercial planting. Larger plantings will no doubt follow when some of these varieties have gained the confidence of the people, for one of the chief drawbacks to nut planting in the past has been the common belief that a semi-tropical climate is essential to the production of such nuts as almonds, pecans and Persian walnuts.

The Utah Agricultural Experiment Station has distributed about one hundred Persian walnut trees to coöperative planters over the state the past season. Ninety-five per cent of the trees are making a thrifty growth, while a similar planting made in 1912 gives good promise.

The following varieties are included in the experimental lot; Chaberte (grafted on black walnut); Franquette (on black and English walnut); Franquette (Vrooman Strain); Mayette (on English Walnut); Parisienne (on the black walnut); Pomeroy (seedling); Pomeroy (on black walnut); Rush (on black walnut).

A number of seedling trees have been discovered by the writer during the past year, throughout the state. Some of these seedlings are producing a fairly good type of commercial nut. What is more important, however, the success of these seedling Persian walnuts points to the practicability of planting the hardier varieties of this nut in the intermountain states.

REPORT FROM G. H. CORSAN

Location—Toronto.

Season—Winter, 1913–1914; Spring, 1914; Summer, 1914.

Type of season—November and December very mild. The ground was not frozen the least on January 1, 1914. January 12 the coldest day Toronto ever experienced 22° F. below zero. On February 12 it was 18° F. below zero. January, February and most of March *very* steady cold. Very little snow all winter, none on January 12.

Except those that I smothered by *too* much care the following seedlings lived through the winter and are alive today: Pecans; pinus edulis; pinus Koriensis; chestnuts; filberts; all the juglans including Californica and Canadian seed of regia; pawpaws; persimmons. My "mountain rose" peaches had not a twig winter killed though my Fitzgeralds, a very hardy peach, had some; this peach may not be as hardy as it is blown up to be. The season has been very dry and this summer many of the Paragon chestnuts died that were not watered. My Pomeroy walnuts are having a struggle to keep good form but I think that I will have a few hardy ones selected from them, as these last two winters have been the most trying on young trees we have ever had, of which fact I am glad. Here at Battle Creek are a dozen of Mr. W. C. Reed's grafted pecans; all are alive and growing strong as are mine in Toronto. I wrote you of the horrible abuse that mine had while in transit and they had a right to die but lived. Pecans grow very late into the fall and do not shed their leaves early so that I feel sure that the wood will harden sufficiently to stand the winter. The next question is, will the nut mature where grapes and peaches grow and just escape the October frosts. I saw many splendid pecans at Burlington, Iowa. Native pecans for seed stock can be procured from there in abundance. The nuts there are long and narrow, but not thick-shelled, and sell retail in the stores for not less than twenty cents a pound. The climate at Burlington has been 35° F. below zero some winters.

I am certain from my observations all over northeastern North America that the pecan has far more possibilities than the English walnut or any other nut unless we can develop a blight proof chestnut.

The north Chinese walnut has been doing wonderfully well in

Toronto and those two trees fifteen and seventeen feet high have not a twig killed. They do not bear as early as the Japanese. Their leaves are much longer than the English walnut but the nut is fully as good as the best California, Persian walnut that ever reached the market. Many of the nuts are paper shelled, some burst open at the suture. Their appearance is almost the same as the English but the tree is much hardier, growing at the extreme north of China. Then this is the tree that the nurserymen of Ontario have been selling as "English" walnuts and guaranteeing to be hardy. But as soon as we saw the leaf and the trunk we at once knew them for north Chinese walnuts and upon being told that, the men acknowledged that they were. Just today I have been speaking to a missionary from the extreme north of China and he informs me that they have two feet of ice every winter where these trees grow in abundance with the finest nuts he ever saw. This fact and the fact that really good pecans can grow up north are the two facts that I wish this association to work on in order to get results that are certain of success.

DISTRIBUTION OF PERSIAN ("ENGLISH") WALNUT SEEDLINGS IN MICHIGAN

Attention should be called to the work of Mr. Myron A. Cobb of the Department of Agriculture of the Central State Normal School, Mount Pleasant, Michigan, of which he sends the following outline. Mr. Cobb has consented to send out with the trees a leaflet, to be supplied by this Association, explaining the fundamental principles of nut growing.

It is interesting to note the cost of these seedling trees, one and one-half cents each, including postage.

The success of Mr. Cobb's work shows the readiness of the public for it. Our Association should encourage similar work in other states.

"About five years ago, I began the distribution of walnut seedlings by planting a few seeds in our orchard, and distributed them to the schools of Isabella County. I distributed about five hundred each year, making a total of two thousand five hundred seedlings. This year, the idea has been more widely advertised, and the demand for seedlings has been enormous. I have distributed this year five thousand seedlings and have received orders for about two thousand more which I could not fill because of lack of trees.

"This work was taken up primarily with the idea of distributing walnut seedlings on the farms and incidentally to teach how trees are raised and to correlate the work of the school to the home.

"The trees have been distributed largely by parcel post, in amounts from three to three hundred. The trees have been sold for one and one-half cents each. This covers the original cost of the trees and the postage on the same. Some of the trees have been grown upon our own grounds, but the most of them have been obtained from the D. Hill Nursery Company, of Dundee, Illinois. The distribution has been largely through the schools, but many organizations have interested themselves in the movement, as farmers' clubs, women's clubs, civic improvement leagues, etc. The Women's Club of Pontiac distributed two hundred and seventy-five. We prefer to distribute them through the schools.

"These trees have been distributed to nearly every portion of Michigan, Mr. Weidman, a prominent lumberman, sending one hundred to the Upper Peninsula. Several hundred have been sent

to the burned over areas of Northeastern Michigan, some have been planted in the cities and along the roadside, but the most of them have been distributed to the farms. The demand this year exceeded our anticipation. Many farmers and organizations have been greatly interested in securing and distributing the seedlings, and some of the requests for seedlings have been very interesting, in that they show such a great desire on the part of the farmers to secure the trees, and it has been with extreme regret that we were obliged to return their money, because of lack of seedlings.

"This movement seems to be especially interesting in many ways and plans are being made to supply the demand the following season and to extend the work along other practical lines and apparent indications are that our slogan, 'A walnut tree for every farm,' will be a reality."

EXAMPLES OF SOME RECENT CORRESPONDENCE

FARMINGDALE, ILL., August 5, 1914.

I am interested in fruit and nuts of all kinds, but plant only for home use and experimentally.

I believe the chestnut is a better money nut here than the pecan, as natives here bear very sparsely and irregularly although the catkins or male part usually come out in great profusion.

I note that you say "there is probably not much use in trying to grow the pecan or Persian walnut outside the peach area." Here our pecan seems as hardy as the average apple, withstanding 25° below zero or more with little or no injury. I find that the "Andrus" Persian walnut is *much* hardier than the "Pomeroy" as I planted two small one-year trees that endured the following winter 20° below, with no injury to even terminal buds. So twenty years may show a change of opinion as to the value of the Persian walnut in the Middle West.

The Japanese walnuts here are often injured by winter at 15° below, but there may be hardier types and varieties than those I have tried.

I have never been able to *graft* the pecan successfully—annual or budding has given me the only success I have had. And in years like this and last, I find it very difficult to make a transplanted grafted pecan live without watering.

I have failed, so far, in finding a practical method to keep chestnuts in good eating and planting condition until spring. If stored in the ground cellar or as peach pits, they mould, if kept in an ordinary building they become too dry.

BENJAMIN BUCKMAN.

South Waterford, Me., November 21, 1914.

Dear Sir:

I have just read in the last issue of the *Rural New-Yorker* a very interesting article on nut growing, giving your name.

For several years I have thought that it would be better for people in the New England States to give more attention to nuts than so much to apples, but I have not been in a position to start in with nut trees much until now.

Although 65 years old and somewhat used up with rheumatism I am not ready to give up yet. . . .

When I started on this farm it did not produce a barrel of grafted fruit. There were quite a lot of natural fruit trees that never had been trimmed or cared for in any way. I grafted these trees and set out some from time to time until now the farm produces from 500 to 800 barrels per year.

This year apples at picking time sold slow for $1.00 per barrel for No. 1's, No. 2's not wanted at any price.

I often think that if I had set out a few acres of nut trees 25 years ago they would have been more profit now than the whole 200-acre farm is. . . .

Last spring on account of my lameness and the scarcity and the high price of farm help I sold my large farm and bought a small place. . . . Last spring I had about two acres of this land plowed up and during the summer thoroughly worked over with the idea of next spring setting it out to nut trees of some varieties that would do best here. Now I do not know anything about nut growing or what varieties best to plant. If you can help me out by putting me in a way to get this information you will confer a great favor.

United States Department of Agriculture,
Bureau of Statistics,
(Agricultural Forecasts)
Office of the County Correspondent.

Isle La Motte, Grand Isle, Vermont, December 10, 1914.

My dear Sir:

I wish to set out several nut trees next spring here on this island in Lake Champlain. We have lots of hickory nuts, butternuts, hazelnuts and beechnuts growing wild here and Champlain says in his narrative that there were lots of fine chestnuts growing here 300 years ago. Now I want to try some chestnuts, black walnuts, English walnuts, pecans, and almonds. If you can tell me the hardiest varieties of each and where to get trees I shall be greatly obliged. I have my doubts about pecans and almonds but am willing to try them here. I am growing peaches here where they never grew before.

Richmond, Va., December 13, 1914.

Dear Sir:

I am just commencing an enterprise in propagation of nut trees here just north of Richmond. I shall have plenty of time to do some experimental work in planting of unknown varieties and would like to do some such planting. I want any information I can get on varieties of English and black walnuts, hazelnuts, hickories and persimmons, "sloes" and any other varieties of currants. If I am

not trespassing too much on your time please put me in touch with parties who can give me information. Please advise me if your association has any publications on the subject.

I am a retired civil engineer and my hobby has been all my life the study of forest trees. I am now in a position to do some planting and I should be very glad to coöperate with your association. I am here located exactly on the line of demarcation between northern and southern forest growths and I think I have exactly the location for experimental work. . . .

NEW MILFORD, CONN., December 8, 1914.

MY DEAR DR. DEMING:

This morning I am sending, by parcel post, a sample of hickory nuts to compete for the prize which I saw has been offered by the association, of which you are secretary.

My father, while he was living, sent an exhibition of nuts to the Pan-American, also to the St. Louis Fair, and received the highest award given for nuts at both Expositions.

NEW LONDON, CONN., December 3, 1914.

DEAR SIR:

We are all elderly people, lacking energy to cultivate our farm land as closely as we ought. Some of us are interested in nut culture and have suggested that we plant some nuts and watch their growth from the very beginning. Of course, we only wish nuts of the best varieties and easiest culture. We only wish *hardy* nuts, that do not need grafting, and we prefer those that come into bearing early. We do not wish any of the Mammoth dwarf, Japan chestnut. We bought a nice one, but it *will* not mature its fruit, and is gradually dying. We find great difficulty in purchasing nuts. Those who have *trees* for sale, refuse to sell the NUTS.

A person who has a few Japan walnut trees in connection with some other business, very kindly offered to sell us some nuts, and these are all we have been able to purchase so far. There are but very few nuts that we would attempt to try. We wish to find some of the very best of filberts or hazelnuts, that we shall probably cultivate in bush form. We are interested in the *hardy*, hard shell almonds. Do you think we could do anything with them? I *think* they do not have to be grafted. Do you know of any species of English walnut or Madeira nut, that are perfectly hardy, and come into bearing early, that would serve our purpose?

I know we are asking quite a favor, for strangers, but if you will kindly assist us a little, we will thank you very much.

BROADWAY METHODIST CHURCH,
FARGO, N. D., November 10, 1914.

DEAR SIR:

I saw your statement in the *Southern Planter* this morning and am writing, not to tell you where choice nut-specimens are to be obtained but to ask a few questions relative to the obtaining the *best* information possible to the growing of nuts. I have a ten-acre tract about twelve miles straight south of Staunton,

Va. When I purchased the tract the chestnut and hickory were thriving. I have had about one half of the property cleared and some trees planted. Among the trees are twelve hardy English walnuts from Green's Nursery, Rochester, N. Y., 6 "Mayo" and 6 "Pomeroy" walnuts from Glen Brothers, Rochester, N. Y. I am interested in nut-culture. I have inquired of Glen Brothers if the Kentish Cob would thrive there. They assure me it will. If there is a chance to make a success of nuts, I would turn my time and thought to the raising of walnuts and Kentish cobs and filberts. What would you advise? If you cannot give me the desired information, kindly give me directions to the one who can. I was brought up among the walnuts and filberts and cob-nuts in the County of Kent, England, and now my thoughts are turning to the delights of earlier days and I intend coming to the Shenandoah Valley in the near future and making my home there. . . .

THE SECRETARY'S REPLY

Georgetown, Conn., November 13, 1914.

My dear Mr. ——:

It gives me great pleasure to reply as well as I am able to your letter of November 10th. You are in the position of many thoughtful men of the present day in craving the peace and delight of a life that is nearer to nature. You have also a small tract of land in a favored part of our country, and you have been led to believe, by the statements that you have run across in chance sources, that the returns from nut growing may enable you to attain your ambition.

Our president has a place at Roundhill, Va., not very many miles from yours. He is a professor of something like "Efficiency" in the University of Pennsylvania. He is young, aggressive and very efficient himself. His father was, and he himself is, an orchardist and fruit grower. Both he and I have been for some years working at the problems of nut growing. But it is only this year that we seem to have overcome the difficulties of grafting and budding nut trees. We have the greatest faith in the future success of nut growing, but we do not know how long it will be before we shall know just what varieties of nuts to plant ourselves, least of all to advise others to plant, with any certainty of success. For the man, however, who realizes that nut growing in the North is still in the experimental stage, we have no end of information and advice.

The information you have had from interested sources is misleading. Probably you would not live long enough to get satisfactory results from the seedling trees you might plant, even if such results ever came. To get reasonably prompt and certain results from nut trees it is necessary to grow such trees grafted or budded from trees of known good bearing record, just as the same thing is necessary with the common fruit trees.

Your information about the Kentish cob and the filbert is but half the truth. The shrubs will thrive for a time in almost any place. But they have nowhere in the East been a success because sooner or later they are destroyed by a disease. One of our great nut growing wants is a filbert or hazel of good size and quality that has the blight resistant quality of our native hazel.

My advice to you then would be as follows. If it is your idea to make a living by nut growing on your ten acres in Virginia within a reasonable number of years, I do not advise you to attempt it. If you wish to take up nut growing as offering

an occupation of the greatest interest, with opportunity for the solution of problems of great importance to mankind, and a fair promise of eventual money profit to yourself or to your heirs, then I should certainly advise you to take up nut growing.

I would not attempt to grow the hazel or the chestnut at present, except in an experimental way. The nuts of best promise for you are the Indiana or northern pecans and the English walnut. But it requires considerable study of the subject before one may take up the practice of nut growing without the probability of making unnecessary mistakes, and unnecessarily losing time and money in repeating the experiences of others.

The wilful misstatements of some nurserymen, and the ignorance or carelessness of others, has hindered the progress of nut growing. Fortunately we have several nurserymen who have made a study of the subject, who are honorable and truthful men, and on whose statements you may rely. The only possible qualification of this statement that I know of is that an allowance for enthusiasm might be borne in mind without risk of harm. I enclose a list of such nurserymen, accredited by this association.

Your letter seems to call for this extended reply which I hope will be of service to you. If I have left anything obscure that you would like to know about, or if I can assist you in any other way, please let me know.

With the hope that you may be able to take up this most fascinating avocation with pleasure and profit, I am

Very truly yours,

W. C. Deming.

PRELIMINARY REPORT ON THE PERSIAN WALNUT

The secretary herewith presents a preliminary report on the investigation of the Persian walnut. No attempt has been made to collect information about the walnut on the Pacific Coast, which is quite another matter. But the investigation reports very briefly on trees from Canada to Georgia and from Massachusetts to Utah.

The result of the investigation so far is hardly more than a bare catalogue of the trees which the secretary has been able to locate, and is intended simply as an aid to further investigation. It is now published with the hope that members and others may become informed of Persian walnut trees that it may be possible for them to locate, observe and report upon. It is manifestly impossible for any one person, unless some paid agent of the government or other institution, to investigate many of these trees personally, they are scattered over such a wide area. Correspondence is usually unsatisfactory and personal investigation is the only way to get good results.

Probably only a small part of all the existing trees is here catalogued. But among them, and among the others that will come to light in the constantly widening investigation by an increasing number of interested persons, will certainly be found varieties of merit and adaption to different sections of the country.

As the meeting next year at Rochester is to give especial attention to the Persian walnut it is to be hoped that members and others will make special efforts to send to the meeting specimen nuts and reports of trees.

THE PERSIAN WALNUT

Canada

Brantford—Dr. D. S. Sager. Knows at least 50 trees. Is top working native walnuts and other work.

Grimbsy—H. K. Griffith. Bearing tree or trees.

Grimbsy—Louisa Neller. Bearing tree or trees.

Grimbsy East—Beverley Book. Bearing tree or trees.

St. Catherins—Miss Alice Berger, 251 Queenston St. Several bearing trees. One tree 100–200 pounds annually.

St. Catherins—Harper Secord, R. 2. Twenty-eight young seedlings.

St. Catherins—James Titherington. Bearing tree or trees.

St. Catherins—J. J. Fee, Niagara St. Bearing tree or trees.

St. Catherins—F. D. Solvyne, Carleton St. Bearing tree or trees.

Toronto—G. H. Corsan, University of Toronto. Many young walnut and other nut trees. "Hundreds of thousands being planted in Niagara Peninsula."

New York

Chappaqua—F. M. Clendenin. Just bearing few nuts after 8 years.
Lockport—A. C. Pomeroy. Bearing orchard, seedlings.
North Avon—Adelbert Thompson. Bearing orchard, seedlings, 225 trees.
Hilton—E. B. Holden. Bearing trees.
Rochester—B. F. Whitmore, 520 Park Ave. Three bearing trees.
Holley—W. E. Howard. Four bearing trees. Knows of others. "Hundreds of trees."
Canandaigua—Bradley Wynkoop. Bearing tree.
Brockport—Marcus Cook, 90 Holley St. "Nearly 100 bearing trees within 5 miles of Brockport."
Fairport—Pickering Bros., Some Pomeroys.
Fairport—N. A. Baker.
Victor—E. Y. Shilling. Bearing tree.
Victor—A. B. Wood. Bearing tree.
Victor—Josiah Snyder. Bearing tree.
Watkins—Write E. C. Gabriel, Rock Stream. Tree reported by Prof. Corbett at N. Hector, 2 or 3 more east side of lake.
Earlville—Francisco I. L. Mulligan. Twenty-nine Pomeroys and others.
Hoosick Halls—A. A. Baker, R. 2. Knows of bearing tree near Long Island.
Port Jefferson—Joseph Schriever. "Fine Specimen."
Huntington—Historical Society. "Fine Specimen."
Between Huntington and Centerport, on Gallows Hill, old Geo. S. Conklin place, occupied by "Peachy," as reported by Uncle Jerry Wockers of the Ithaca *Journal* office. Bearing tree.
Oyster Bay—Joseph H. Sears. Bearing tree, reported by Henry Hicks.
Oyster Bay—Mrs. W. H. Burgess. Bearing tree, reported by Henry Hicks.
Glen Cove—John T. Pratt. Bearing tree, reported by Henry Hicks.
Glen Cove—W. L. Harkness (Dosoris). Bearing tree, reported by Henry Hicks.
Woodbury—L. Piquet. Bearing tree, reported by Henry Hicks.
Roslyn—Admiral Aaron Ward. Bearing tree, reported by Henry Hicks.
Hempstead—Rev. Chas Snedaker, St. George's Rectory.. Bearing tree, reported by Henry Hicks.
New York City, Westchester—Dr. Deming. Three Morris trees.

District of Columbia

Washington—Barnes, Weaver, Kaingler, Stabler and other trees.

Delaware

Wilmington—Dr. Rumford.
Smyrna—Walter L. Marks.
Magnolia—J. B. Tisdale. One or more bearing trees. Reported by E. B. and J. M. Reed, Fredonia.
Millsboro—G. L. Ellis. Twenty miles away some trees.

North Carolina

Carthage—I. W. Williamson. Few young trees.
Carthage—John A. McLeod, R. 3.
Pomona—J. Van Lindley. Several trees near Southern Pines.

Ohio

Cincinnati—I. B. Johnston. "About 50 trees near Cincinnati."
Gypsum—H. G. Miller, of Wm. Miller and Son, Elmwood Fruit Farm. Two trees, 20 years old. Also young Pomeroy trees. "Several very large bearing trees within a few miles of here."
Dayton—Fred Kircher, 221 S. McDonough St.
Amherst—O. F. Witte, R. 2. Bearing tree.
Middletown—Levi Leonard. One hundred seedlings. Knows of old trees in Lancaster Co., Pa.

New Jersey

Lumberton—C. S. Ridgeway. "Peerless Paper Shell," 25 years, 50–100 pounds.
Paterson—Thos. Rodgers, 236 W. 25th St., W. End. Bearing tree.
Salem—Weber; write D. Harris Smith, Att'y. Rep. J. L. Doan.
Haddonfield—J. Hutchinson.
Raritan—Philip Lindsley, Box 350. Bearing tree.
Flemington—Rev. Dr. Sonne. Bearing tree.
Marlton—C. D. Barton. Knows good bearing trees.
Moorestown—Charles Haines. Bearing tree.
Delanco—Frank Jones. Bearing tree.

Virginia

Williamsburg—D. S. Harris, Box 416, 33 Febrey. "Grafted."
Williamsburg—J. A. Bechtel, R. 2.
Mint Springs—Williams place. Two trees; rep. *Am. Nut. Jour.* 8, 14, p. 39.
Lynchburg—Crockett.
Roslyn—R. S. Carter, Box 41. Three trees.
Emporia—H. W. Weiss. "Fifty trees on different farms; English, Japanese and black."

Maryland

Sandy Spring—Ava M. Stabler.
Colton's Point—James K. Jones. See Circular of J. F. Jones. "Eight or ten bearing trees."
Forest Hill—Wilmer P. Hoopes.
Churchville—Alexis Smith. "Alexis."
Sharon—Mrs. S. J. Poleet. "Sheffield."
Berkeley—J. T. Smith. "Smith."
Janettsville—David Hildt. "Beder."
Vale—Kate Hooker. "Hooker."
Baltimore—Franklin-Davis Nurseries.
Princess-Anne—Ida M. Lankford. Bearing trees.
Cooperstown—L. J. Onion, P. O. Sharon. "Sir Clair."

Massachusetts

Boston—Mrs. Schultz, 335 Cornell St., Roslindale, Boston. Bearing tree.
Newburyport—Reported by C. F. Knight, Rowley. Bearing tree.
Winchester—Brackett (Bro. of G. B. Brackett). Bearing trees.

New Hampshire

Keene—Reported by A. C. Pomeroy. Pomeroy trees.
Newmarket—Alfred C. Durgin. Six Pomeroy, 2 Rush, "Supposed to be grafted."
Enfield—Forest Colby. Some trees.

Michigan

Mt. Pleasant—Myron A. Cobb, Central State Normal School. Has been distributing thousands of walnut seedlings.
Coloma—W. C. Reed, Vincennes, Ind.
Almont—F. P. Andrus. Bearing tree and seedlings.
Augusta—Orville I. Miller. Buds from Andrus.

Alabama

Huntsville—Mr. Mayhew, Westchester, New York City. Reports tree.

Tennessee

Greenville—Wm. H. Brown, 516 Main St. Reports 3 trees, El. 1500.

Georgia

Sharpe—Paul Dyer. Reported by Prof. McHatton.

Idaho

Boise—S. A. Gehman. Local bearing trees. C. C. Vincent, Ag. Exp. Sta. Moscow

Utah

Lehi—Mrs. J. T. Winn. Several trees.
Salt Lake City—J. T. Harwood (brother of above). Many bearing trees. Leon D. Batchelor, Horticulturist, Ag. Exp. Sta. Logan.

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AUTHORITIES AND SPECIAL CORRESPONDENTS

For a list of authorities and special correspondents in all the states of the Union, and elsewhere, see the report of this Association for 1913.

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PRESENT AT THE FIFTH ANNUAL MEETING OF THE NORTHERN NUT GROWERS ASSOCIATION

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C. A. Reed
R. T. Morris
J. Russell Smith
Col. C. K. Sober
W. O. Potter
E. A. Riehl
J. L. Doan
H. R. Weber
C. P. Close
R. L. McCoy
J. F. Wilkinson
T. P. Littlepage
R. T. Olcott
W. C. Deming
H. D. Simpson
Ray C. Simpson
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Hugh C. Schmidt, Evansville
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Mrs. J. W. Strassell, Rockport, Ind.
Miss Helen Gentry, Rockport, Ind.
Chas. F. Hartmetz, Evansville, Ind.
Reporters

ANNUAL MEETING IN 1915

The following letter was sent to our members and some of our correspondents living in or near Rochester. The secretary would be pleased if every person who opens this volume at this page would read this letter and, having read, would make a note of it for action.

GEORGETOWN, CONN., September 10, 1914.

DEAR SIR:

Rochester, N. Y., is quite likely to be selected as the place for the next meeting of the Northern Nut Growers Association, and the Persian ("English") walnut as the subject for especial consideration.

There are many Persian walnut trees in Rochester and vicinity. Will you not bear in mind that we shall probably meet there and help to make the meeting a success? One way in which this can be done is to look up *now* any walnut trees, or other superior nut trees, observe their bearing and get their records and samples of the nuts, with photographs if desirable.

Another way to help is to talk about the association and this meeting to others and get them interested in the association and in reporting nuts.

Any assistance in making arrangements, or in providing attractions for the meeting will be most welcome.

I append a list of members and correspondents in and about Rochester. Mr. Olcott, the editor of the *American Nut Journal*, will undoubtedly act as a central bureau for information and report.

Let us make this coming meeting go far toward settling some of the undecided points about the Persian walnut in the East.

Yours truly,

W. C. DEMING.
Secretary.

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NORTHERN NUT GROWERS ASSOCIATION

REPORT

OF THE PROCEEDINGS AT THE

SIXTH ANNUAL MEETING

ROCHESTER, NEW YORK
SEPTEMBER 1 AND 2
1915

NORTHERN NUT GROWERS ASSOCIATION

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ROCHESTER, NEW YORK
SEPTEMBER 1 AND 2, 1915

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Promising Seedlings—T. P. Littlepage, C. A. Reed, J. Russell Smith

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† Life member.

CONSTITUTION

Article I

Name. This society shall be known as the Northern Nut Growers Association.

Article II

Object. Its object shall be the promotion of interest in nut-bearing plants, their products and their culture.

Article III

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the rules and regulations of the committee on membership.

Article IV

Officers. There shall be a president, a vice-president and a secretary-treasurer, who shall be elected by ballot at the annual meeting; and an executive committee of five persons, of which the president, two last retiring presidents, vice-president and secretary-treasurer shall be members. There shall be a state vice-president from each state, dependency or country represented in the membership of the association, who shall be appointed by the president.

Article V

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the following year.

Article VI

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

Article VII

Quorum. Ten members of the association shall constitute a quorum, but must include a majority of the executive committee or two of the three elected officers.

Article VIII

Amendments. This constitution may be amended by a two-thirds vote of the members present at any annual meeting, notice of such amendment having been read at the previous annual meeting, or a copy of the proposed amendment having been mailed by any member to each member thirty days before the date of the annual meeting.

BY-LAWS

Article I

Committees. The association shall appoint standing committees as follows: On membership, on finance, on programme, on press and publication, on nomenclature, on promising seedlings, on hybrids, and an auditing committee. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

Article II

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

Article III

Membership. All annual memberships shall begin with the first day of the calendar quarter following the date of joining the association.

Article IV

Amendments. By-laws may be amended by a two-thirds vote of members present at any annual meeting.

Northern Nut Growers Association

SIXTH ANNUAL MEETING

SEPTEMBER 1 AND 2, 1915

Rochester, New York

The sixth annual convention of the Northern Nut Growers Association was called to order in the convention hall of Powers Hotel, Rochester, New York, on Wednesday, September 1, at 10:15 A. M., the president, Dr. J. Russell Smith, presiding, and thirty-two people being assembled.

The President: Ladies and Gentlemen, Members of the Northern Nut Growers Association, the meeting will please come to order.

With an organization of this sort, the main purpose of the meeting is the dissemination of information, but it is necessary that certain business shall be conducted to keep the organization going. Some business is dry; usually the reports of our secretary-treasurer are not, and the first order of business, I think, should be to hear from our secretary-treasurer.

Mr. Littlepage: I should be glad to have the floor for a moment, Mr. President. In the Congressional Library at Washington City are many very beautiful and attractive inscriptions and quotations, one of which has always appealed to me as a lawyer, and I have repeated it many times:

"Of law there can be no less acknowledged than that her voice is the harmony of the world."

Mr. President, I have noted very many times that the voice of the law is sometimes silent. It speaks only through those in authority and there should always be some emblem of authority. I therefore took the liberty, Mr. President, of having made for you a gavel from the wood of an Indiana pecan tree, where as a youth I lived and learned of this most delicious of all the nuts, and I take pleasure in presenting it to you, and if anyone doubts the hardiness or hardness of the Indiana pecan, I authorize you to demonstrate both.

I am presenting you duplicate gavels, Mr. President, one of which I desire to have you turn over to your successor in office as an

official emblem of his authority, to be used at future meetings; the other I am presenting to you as a personal tribute for your most excellent work in behalf of northern nut culture. This gavel I shall ask you to place among the trophies in your beautiful mountain home, where the birds sing sweetly, the sun shines brightly, and the breezes murmur softly; and where the days are made to rest and the nights are made to sleep.

THE PRESIDENT: Mr. Littlepage, not being prepared for this, and not being naturally eloquent, I am unable to make a speech. However, as a part of the way out of the difficulty, I accept this one officially with great pleasure, and personally accept the other with deep gratitude, and desire to express the appreciation of the meeting.

The pecan is calling the walnut meeting to order. Last year we went to see the pecan; this year we come to see the walnut, which has done more than any other nut in the East.

We will now listen to the report of our secretary-treasurer.

REPORT OF THE SECRETARY-TREASURER

Balance on hand, date of last report	$7.23	
Receipts:		
Dues	$379.30	
Advertisements	42.00	
Contributions	42.50	
Sale of report	22.40	
Contributions for prizes	40.00	
Miscellaneous	1.05	
		$534.48
Expenses:		
Printing report	$233.76	
Miscellaneous printing	51.80	
Postage and stationery	41.09	
Stenographer	2.00	
Express, freight, carting	3.74	
Prizes	10.00	
Check J. R. S. expenses, circulars	37.30	
Bills receivable	10.00	
Miscellaneous	4.55	
		$394.24
Balance on hand		$140.24

This is the best financial report that the treasurer has ever been able to transmit, and this is chiefly due to the efforts of our president who, during the year, has sent out numerous notices of, and articles about, our Association, its purposes,

and the desirability of finding and propagating our best nut trees. He also offered three prizes of $5 each for a nut contest and did the work necessary to get publicity for this contest. He sent letters to the members of the horticultural societies of Pennsylvania, New Jersey, Virginia, Maryland, and Ohio which resulted in our getting 24 new members, mostly from the state of Pennsylvania. Twenty-five dollars of the cost of this circularizing the president paid out of his own pocket. The rest was more than made up by the fees of new members. The president also had printed an educational leaflet on nut growing for distribution by Mr. Cobb with the nut trees which he sends to the schools and farmers of Michigan. With Professor Close he was on the finance committee which sent a circular letter to the members of the Association for funds to help pay for the printing of the annual report, and obtained advertisements for the report. As stated in the treasurer's report contributions for this purpose amounted to $42.50 and advertisements brought in $42.00.

Prizes

The Association offered last year prizes of $5 each for the best shagbark hickory nut, black walnut and hazel nut sent in.

Something over a hundred specimens were received and the prize for hickory nut was awarded to J. K. Triplett of Elkins, W. Va. The prize for black walnut was awarded to J. G. Rush of West Willow, Pa. Mr. Rush returned his prize to be used for the purposes of the Association. No prize for hazels was awarded as only one or two insignificant specimens were sent in.

Perhaps the stimulation of this contest accounts for our being able to offer such substantial prizes for this year. In addition to the $80 worth of prizes already announced the secretary has received from a life member, James H. Bowditch of Boston, a check for $25 as a prize to be offered by the Association for a hickory nut under such conditions as the Association may decide. A circular announcing these prizes has been sent out to agricultural and other papers to the number of 200, the expenses of which have been borne by another member, Mr. Chas. H. Plump of Connecticut. A committee on competitions should be appointed or the direction of them delegated to some already existent committee.

Membership

Seventy-four members were added during the interval between this meeting and the last, one less than in the previous year. Since its organization 287 persons have joined the Association. We have at present 153 paid up members, 21 more than last year. There are a few members whose dues are unpaid who are active workers and will eventually pay, probably.

Four members have resigned, though none in anger, and we have lost one by death, the late Prof. H. E. Van Deman.

Annual Dues

Some way should be found out of the difficulties arising from the dissatisfaction of members who join late in the year when they receive a notice for dues soon after having once paid.

It is desirable to take in members at all times during the year. At the same time some method should be found to give the late comer something for his money. Shall membership continue to date from the calendar year? Or shall we make some change? Some societies date memberships from the opening of the annual meeting. It would not be impossible to make memberships date from the

beginning of the quarter year immediately following date of joining. This would give every member a full year at least before he would again receive a notice for dues.

It would be quite inconvenient to date each membership from the day of joining. It would not be so bad if members paid promptly on receipt of notice.

Or a rebate might be made for each month of the year elapsed before new members' dues were paid.

Meetings

No field meeting was held this year. It has been suggested, and would seem to be a favorable subject for discussion, that it might be well to hold our annual meeting late in the year in some central location, such as New York City, Philadelphia or Washington, for our business and formal program of papers and discussions, and the study of the nuts sent in, perhaps for judging any competition that might be held, if the meeting were late enough for that; and a summer meeting of informal nature at some place where nut trees with their crops growing could be studied.

Nut Journal

Our official organ, the *American Nut Journal*, has done its part well through the past year and is becoming, as it should, a very important element in the success of the purposes of this Association. Most new and old members of the Association have availed themselves during the year of the offer of membership and the *Journal* for $2.50. In spite of the reduction of 25 cents on each membership, the receipts for dues have increased from $273 to $331. I would suggest that the membership fee be still further reduced by 25 cents, when combined with subscription to the *Journal*, if the editor is willing to continue the present arrangement whereby the price of the *Journal* is reduced to 75 cents when subscribed to with membership, so that the two together will cost $2.25. Another year it may be possible to make a similar reduction. The object toward which we ought to work is membership for $1, and membership with the *Journal* $2. I should like to hear the opinions of the members as to the advisability of working to reduce our dues to $1 annually.

How Members May Help

At the risk of monotony I will repeat my concluding remarks of last year and ask that each member help increase the prosperity and usefulness of the Association by enlisting new members, by advertising his business in the annual report, and by paying his dues promptly. The secretary would much rather spend his time answering questions and imparting such information as lies in his power, than to have to send repeated notices to members in arrears for dues.

The secretary will be happy at all times to learn of the plans and progress of the members.

The President: You have heard the report of the secretary. There are two things to be done with it. It is, as you will notice, first a report of the year's business and, second, it has certain suggestions for your consideration. I think that as a business report we can discuss and move its adoption, amendment or rejection. After that we may take up the suggestions.

[Adoption moved, seconded and carried.]

He has brought before our consideration the amount of dues, and the question of their payment. I doubt the advisability of a lengthy discussion in this business meeting. I think it better to refer it to the executive committee. Unless I hear further suggestions, I will take that action. The next piece of business is the matter of the report on the amendments to the constitution. Professor Close and the secretary were appointed a committee for this matter, and as Professor Close cannot be here, we will hear from the secretary on the matter. (See amended constitution.)

Dr. Smith: I am now glad to announce that we have covered the necessary business ground, and now come to the real meat of the meeting. We have with us this morning Dr. Baker, Dean of the State College of Forestry, at Syracuse, who is going to address us on the subject of "The Relation of Forestry Conditions in New York to Possibilities of Nut Growing."

THE RELATION OF FOREST CONDITIONS IN NEW YORK TO POSSIBILITIES OF NUT GROWING

Dr. Hugh P. Baker, Dean of The New York State College of Forestry at Syracuse University

The forester presumes to come before your organization because he is concerned with one of the greatest of the natural resources of this and other states of the Union and not with the idea of bringing information as to details in nut culture. Possibly nut culture as a business is more closely related to agriculture than forestry. Forestry is not subordinate to agriculture in this country but co-ordinate with it. Together they will come as near solving the soil problems of the country as is possible for man to solve them.

The forester is interested and concerned with the wild nut trees wherever he has to do with the forests or forest lands of the country. Throughout the great hardwood sections of the East there are many native nut-bearing trees, and in the proper utilization of the trees which make up the forests the forester is concerned not alone with the lumber which may come from these trees, but he is concerned as well with the value of the by-products of the forest and the influence of the utilization of these by-products upon the forest.

In view of the forester's interest in all of the trees which make up our forests, my purpose of addressing you today is to bring before you the question of the most effective use of the forest soils of this state. I shall also attempt to make some suggestions to your or-

ganization in the matter of interesting the man on the street in nut growing. This profession and the business of forestry have been passing through a period of general educational work in this country. Some of the lessons which we have learned through our efforts to interest the people in their forests may be of help to you in interesting the people both in the consumption and the production of nuts.

New York as a Great Forest State

Twenty-five years ago New York was one of the leading lumber-producing states of the Union. Today some twenty other states produce more lumber than comes from the forests and woodlots of New York. Statistics given out recently by the United States Census Bureau and the Conservation Commission of New York show that, out of the land acreage of over thirty-two millions in New York, but twenty-two millions are included within farms. This leaves something over eight millions of acres outside of farms and presumably non-agricultural. The forests of the Adirondacks and Catskills and the woodlots of the rougher hill counties in the southern and southwestern part of the state come within this vast area of eight millions of acres. Without doubt with increasing population there will come some increase in the use of what are now non-agricultural lands for the practice of agriculture, but with three hundred years of agricultural history back of us in this state it does not seem likely that there will be much change in the relation of non-agricultural to agricultural land during the next half-century.

Out of the twenty-two millions of acres of farm lands in the state but fifteen millions are actually under cultivation, leaving, therefore, from six to eight millions of acres within the farms of the state but lying idle. That is, we have a Massachusetts enclosed within our farms which is non-productive as far as direct returns are concerned. Yet there is really no waste land in New York, as every square foot of the state which is covered with any soil at all is capable of producing good forest trees. It is this great area of idle land enclosed within our farms which seems to have unusual promise in the development of nut culture in the state. There is a great deal of land now idle in the form of steep hillsides or ridges or rocky slopes upon which we may grow with comparative ease our walnuts, butternuts, hickories, hazelnuts, in the wild form at least.

The fact that the state is in really rather serious condition financially should be a strong reason for our association to urge upon the farmers of the state the planting of nut-bearing trees that the returns from the farms may be increased by annual sales of nuts

which should in the aggregate in the next fifty years be a large sum of money. It has been estimated that the total debt of the State of New York, that is, the state, county and municipal debts, are equal to $47 for every acre of land, good and bad. On top of this condition the legislature last year laid a direct tax of eighteen millions of dollars upon our people, and there is every indication that it will be several years before it becomes unnecessary to lay a direct tax either larger or smaller than that put upon us last year. There is ever-increasing competition among the farmers of the state as the standards in animal, milk and fruit production are ever increasing. In view of the amount of idle land and of our financial condition it seems to be an unusually opportune time for those interested in nut culture to bring before the farmers and other landowners of the state the idea of planting nut trees, the products of which will add to the annual income from the land.

The State of New York is Somewhat Ignorant of the Value of its Forest Lands

When the New York State College of Forestry at Syracuse began its studies of forest conditions in New York in 1911 it turned its attention immediately to the very large areas of farm woodlots and woodlands within farms. There has been a good deal of general information current among our people regarding the forest conditions of the state, but there is really very little accurate information except such little as the college has secured since 1911. As a first step in the taking of stock of our forest resources and especially the amount of timber in our farm woodlots and what is coming from these woodlots in the way of annual return to their owners, the State College of Forestry in 1912 began, in co-operation with the United States Forest Service, a study of the wood-using industries of the state. This study has resulted in a very comprehensive bulletin issued by the College of Forestry upon the wood-using industries of the State of New York. From these studies it was determined for the first time that New York was spending annually over ninety-five millions of dollars for products of the forest. Unfortunately for the state, we are sending over fifty millions of dollars of this vast amount out into other states to the south and to the west for timber which New York is capable of producing in amount, at least, in its forests and on its idle lands. The report shows further that New York is producing very large quantities of pine and hemlock and the hardwoods, and, much to the surprise of those interested in forest conditions in the state, it was shown that

a large proportion of the hardwoods come from the woodlots in the farms of the state. This would seem to indicate that there is a real opportunity for the growing of such hardwood timber as black walnut, butternut, and hickory, not only on the idle lands of the state which are not covered with forest now, but also in the woodlots of the farms. That is, it would not be a difficult matter to show the farmers through publications and possibly through public lectures that it would be very advantageous to them to favor nut-growing trees and to plant them where they are not now growing, both because of the value of the nuts which they produce and of the value of their wood.

If the people of a great state like New York are more or less ignorant of the extent and value of their forest holdings, how much more ignorant are they of the character and the value of a particular species which make up their forest lands. How few people are able to go into the forest and say that this tree is a shagbark hickory or that that is a butternut or that that is a red pine, and if this is the case, as you will agree with me that it is, is it not time that propagandist or general educational work be done that will bring forcibly to the attention of the wage-earners of the state that it is a financial necessity for the state to consider better use of its forest lands, so that all of the soils of New York may share in the burden of the support of the commonwealth rather than a few of the soils which are now being given up to agricultural use? The wage-earner should know also that nuts used as food are conducive to health and that possibly a more extensive use of nuts with less of meat will mean a considerable difference over a period of a year in the amount that is saved in the living expenses of an individual or a family.

It is often difficult for the forester to interest the average farmer in the planting of trees, even though those trees may add to the beauty and value of the farm or the comfort of the home buildings, but your organization will make a place for itself most decidedly if it will go to the farmer or to a group of farmers and show them that they can actually save money in the purchase of their needed lumber and wood of other kinds if they will cut their woodlots co-operatively and produce in the woodlots trees of greatest possible value and trees which will give such by-products as nuts as well as direct returns from the lumber. Just as soon as you can reach the pocketbook of the average wage-earner, it makes little difference whether it is nuts or books or clothing, they are going to be interested in a thing that will allow them to get more for the amount which they make from their day's labor.

The Association May Accomplish Much by Demonstrating the Value of Nut Trees as Trees and the Value of Their Products as Food

Many organizations in our Eastern States are becoming interested in the beautification of communities and the tremendous development in the use of the automobile is interesting even more organizaations in the beautification of rural highways. It would not be a difficult thing for the Nut Growers Association to interest civic associations or women's clubs in the planting not only of forest trees alone along rural highways but a certain number of nut trees. We are literally in the age of the "Movie" and if a man who walks or drives along our highways can see as he passes the growing nut trees and the bountiful harvest which they may be made to yield, he is being convinced that not only elm and maple are of value along our highways, but that the nut-producing trees may give equal satisfaction in beauty of form and comfort of shade and at the same time yield fruit of very definite value.

Even though the fruit of the nut-bearing trees of our woodlands and highways may not give an annual return to the town or village or county it will bring immeasurable joy and possibly better health to the boys and girls of the future. In many ways the children of this country are educating their parents and it is not an impossible idea to think of the parents of the future being converted by the influence of their children to the desirability if not the necessity of growing trees and nut trees, the fruit of which will give pleasant healthfulness and at the same time aid in the saving of the daily wage and in the support of the commonwealth. I wish to emphasize this idea of considering not alone the financial return from the trees and the forests of this state. As the son of a lumberman and as a forester I am, of course, most vitally interested in the growing of trees as a business proposition, but I feel that such an organization as yours, especially, should look at this matter not alone from actual financial returns, but because of indirect benefits such as the making of outdoor people of us Americans. This can be done, I believe, to a very considerable extent by giving our people, especially the boys and girls, a purpose for getting out into the woodlot and the forests wherever they occur in the state.

The women of this state are interested vitally these days not only in their own welfare as possible citizens, but in the improving of living conditions and opportunities of our people. We should have more women interested in the work of this association and interested in seeing that the future value of nuts is appreciated by the wage-earners of the state, both because of their healthfulness and because

of the possibility of cheapening somewhat the cost of living. I urge upon the organization a campaign of education, a campaign which will reach through the women's clubs, civic organizations, schools and state associations in a way that will cause the people to demand more nuts for food and more nut trees as an absolutely indispensable part of the complete utilization of both the agricultural and forest soils of the state. The agencies working for agriculture and forestry in a state like New York understand these problems, but often it remains for an organization like yours to bring these forces into active play and to produce the results for which you are working. Before you can achieve lasting results and results commensurate with the time and effort which you are putting into the organization, you must get hold of the man and the woman who spend the dollars for the living of our people.

The State College of Forestry at Syracuse Experimenting with Nut Culture

Soon after the organization of the New York State Forest Experiment Station south of Syracuse the college took up the matter of growing nut trees and of improving the quality of nuts of native species. On the New York State Forest Experiment Station just south of Syracuse, where the college is growing a million forest trees a year, there is a woodlot of thirty acres. In this woodlot were a number of native nut trees and these have been set aside for the purpose of grafting and improving to see what can be done in helping out native nut trees of different ages and sizes.

In 1913 the college purchased a thousand acres of cut-over land two hours south of Buffalo in Cattaraugus County. At the same time it purchased one hundred and thirteen acres lying along the main line of the New York Central Railroad at Chittenango in Madison County. This past spring nut trees were ordered from nurseries in Pennsylvania and planted in the heavy soils on the Chittenango Forest Station and also on the State Forest Experiment Station at Syracuse. At the Salamanca station young nut trees are being staked so that they may be protected and cared for with a hope of developing them as nut-producing trees. The college plans, as a part of its work in the Division of Forest Investigations, to see what can be done in the way of grafting chestnut sprouts and in introducing nut-growing trees for the purpose of demonstrating that idle lands within farms may be used profitably for nut culture. The college will be very glad, indeed, to learn of any native nut trees of unusual value anywhere in New York as it is anxious to

get material for grafting to native stock already growing on its various forest stations.

Dr. Smith: It was an exceedingly great pleasure to me to listen to that address by the Dean of the New York State College of Forestry. I want to assure you that his address marks an epoch. He tells us that the State of New York is going to experiment in nut growing, give place, time and money; and this is what I have been long waiting for. I shall defer my discussion until this evening, when I use the screen and lantern.

I rejoice exceedingly that the State of New York is not alone in the march of progress; the State of Pennsylvania is also in line and comes next on the program. Professor Fagan has been making a survey of Pennsylvania with particular reference to ascertaining what it has in nut trees. He will now give us a report.

Professor Fagan: The President has caught me rather unprepared. I did not expect to talk at this time. I had our walnut survey tabulated in regard to county locations, so that you could see the results of our work in the state this past summer. This report is in my grip so I will talk only from memory.

The necessity for this work in Pennsylvania has been increasing right along. The State Experiment Station has been receiving letters nearly every week from parties wanting information in regard to the Persian walnut. The calls for information have been increasing more and more each year for the past three years.

Our people ask questions about the right kind of soils for the nuts—what varieties are best suited for Pennsylvania—how to topwork their standing black walnut—and, in fact, almost any question.

The Experiment Station does not have a nut plantation and it was thought best to study the growing Persian walnut trees throughout the state.

A publicity campaign was started through the agricultural press and our daily and weekly newspapers. In this way we have been able to learn the location of some 1,800 to 2,000 bearing trees in Pennsylvania. I tried to visit the trees this summer but time would not permit.

Trees are reported in twenty-five different counties. Erie County reported, likely, the two largest plantings. Here we have two seedling groves, at least one is a seedling grove. The seedling grove is fourteen years old and contains 250 trees. They are seedling Pomeroy trees and this year show their first real crop of nuts.

Since they are seedlings we naturally find all types and variations among the trees. We see a difference in their foliage, habit of growth, shape and size of nuts. The trees show no effects of ever having been winter-killed. The trees have always been farmed so the owner, Mr. E. A. Silkirk of North East, Pa., has been able to receive returns from his land. Grapes and berries have been grown between the trees as intercrops. The trees are planted on the corners of a 50-foot square and cover about fourteen acres.

In four different counties of the mountain section of the state, bearing trees are to be found. From these trees we hope to find something at least fairly good but above that something hardy. Some of these trees have been winter-killed to a more or less degree, but so have the common peach trees in the same sections.

The southeastern part of the state reports the largest number of trees. From Harrisburg east and south the trees become more common. In this section we find Dauphin, Adams, York, Lancaster, Chester, Philadelphia, Bucks, Lebanon, Lehigh and Berks counties. In these counties the Persian walnut is not at all uncommon. They are often called Dutch nuts as well as English walnuts.

Just north of the above section we find Northampton County reporting a large number of trees, and even in the Wilkes-Barre and Scranton section with a higher elevation the nut is growing and yielding good crops.

I asked nearly all walnut tree owners whether or not they thought the business could be developed, and in most cases they believed it possible.

I have come to more or less of the conclusion from what I have been able to see, that the business will not be developed in our so-called mountain land or upon the waste lands. The better soil should be used for the walnut groves.

As time goes on we are going to find more and more groves of the nuts being planted in our state.

I came here to learn rather than to lecture. If I can answer any question I will be glad to do so. Tonight I will gladly show you a few pictures with the lantern.

I might say that the Experiment Station plans to have a small grove in a few years; with this and co-operative work we hope to be able to give to our growers and interested people some idea of the culture and care of the Persian walnut in Pennsylvania.

Dr. Morris: I don't like to speak so often here, but it is in the spirit of setting a pace rather than of giving expression to my own views.

In the first place, I would like to ask Professor Fagan if he has looked up the matter of the introduction of any of the oriental walnuts into Pennsylvania. According to the knowledge of the botanists, all species of plants from the northeastern Orient are better adapted to the eastern states of America than are any trees from the central or western portions of the Old World. Pacific coast plants do well in England, but not in New England as a rule.

Next I would suggest, *apropos* of the nature of the seedling orchard reported by the last speaker, that no nut tree of any sort be sold under a varietal name for propagation, excepting that it be accompanied by the statement that it is a seedling. This is perfectly proper and fair to all parties.

Going back to the remarks of Professor Baker, a number of very interesting points arose. One reason why the great waste lands of the state have not been covered with forests of nut trees is because we must leave something for the people who are to come 5,000 years after us. We must not accomplish everything in civilization this year. Be generous; leave something for others to accomplish later. Nut trees grown in forest form say to themselves: "Here are trees enough. We shall store up cellulose." Therefore the trees store up cellulose, make great trunks and timber, and little fruit. A nut tree on the other hand which is growing alone in a field says, "Here are not trees enough. I shall be fruitful," and therefore it bears much fruit. Consequently, nut trees to be grown as forest are out of the question as nut producers, but may be very valuable for timber.

In regard to setting out trees along the highways, that is a beautiful idea theoretically. I happen to see one of my neighbors in Connecticut here in the audience. He remembers when I tried to be public-spirited and set out a number of fruit trees around the borders of my place, in order that the passerby might have some fruit. What happened was that not only the passerby wanted fruit, but he wanted it early, and he brought others from a distance who wanted fruit. They broke down the trees, and also entered my premises and carried off my private supply having been attracted by my roadside bait. I wanted to beautify the highway for a mile and set out 3,000 pine trees. After they had grown to look pretty, people came in automobiles and carried them off. These people

could not think of helping to set out roadside trees but when someone else had done it they came and lugged off the trees.

So long as we are in a semi-civilized state, we cannot talk about beautifying our roads, as does Germany. Germany has set an example of efficiency for the entire world, no matter what your opinion may be as to the present conflict. At the present time she is perhaps believing that she is carrying on a utility crusade. One of the German methods is to line the roadways with fruit-bearing trees, including nut trees, in such a way that the income pays the taxes for some villages. But they are under government control.

Mr. Pomeroy: Dr. Morris's suggestion is very good in regard to marking seedlings. Of course his office is in New York City, though his farm is in Connecticut and New York has a law which fills the bill. A customer can get a complete history of the tree from his nurseryman. If from a barren tree, he must so state. I think this state is about the only state that has such a law.

One other thing. The first big battle fought between the Germans and the Belgians was on a highway along ten miles of which stood Persian walnut trees, and I have often wondered how much damage was done to the trees.

The President: I will ask the secretary to read the motion Dr. Morris incorporated in his talk.

The Secretary: "No ungrafted nut tree of any sort shall be sent out under a name for propagation purposes except with the statement that it is a seedling."

Mr. Littlepage: That is a matter which I imagine will come before the executive committee, and I would suggest that it be left in their hands and worked out by them. With Dr. Morris's consent I would refer this to that committee.

Mr. Pomeroy: Just because a tree has been grafted, why is all this necessary? The nurseryman is bound to tell from what it is taken. That is covered by the law. He need not be even a buyer, merely a prospective buyer. What I want to bring out is this. Suppose a nurseryman here in this state sells a tree,—he must have a permit before he can do it; he cannot send even a twig through the post office otherwise. I don't see if a bud is taken from a tree and put on a black walnut tree that it necessarily makes the bud that grows on the black walnut tree any better than the parent.

Dean Baker: I told you I wanted to raise a discussion on this subject. I really am a dyed-in-the-wool optimist. I am willing to sacrifice some nut trees to laboratory purposes for the benefit of

our young men. We want the individuals to profit by the education. This should be an educational society.

The President: I will ask the vice-president to take the chair.

Mr. Reed: At the last meeting a committee was appointed to report on the Persian walnut, of which committee the president was the chairman, and will make his report at this time.

The President: Mr. Chairman, Ladies and Gentlemen: I think you appreciate the chaos at the present moment in the status of investigation of the Persian walnut. When Professor Fagan reports that the number of trees in Pennsylvania exceeds 2,000, most of which he has not seen, this chaos is evident.

The varieties propagated in the eastern United States are experiments. I have done nothing that will compare with Mr. Fagan's work, but have found certain interesting facts.

First: I found in Maryland a Persian walnut which does not come into leaf until June. When the cherries are ripe, it is just coming into leaf; and it has borne regularly for fifteen years.

While going through the orchards at Grenoble in France, I asked a man "What is the matter with that tree?" This was on June 9th. "There is nothing the matter," he told me, "it is only coming into leaf." I want to call your attention to possibilities of a hybrid of that tree and the Maryland tree. The Persian walnuts of the Grenoble tree were of good quality, but low yield. The Maryland tree is a heavy yielder but of third quality.

In this matter of variety, I want to emphasize Dr. Morris's point of the great possibilities of the oriental walnut. Great results are likely to be attained from the introduction of these species into Pennsylvania, New York and elsewhere in this country.

Second: What is a good walnut? They may be divided into three qualities:

1. Positively sweet.
2. Neutral.
3. Those with a little bitterness in the skin of the kernel, which develops as you masticate the kernel.

Most of those which distinguish themselves for good yield here in the East are unfortunately of the third class. I have taken samples of these to commercial dealers. One of the largest walnut buyers in Philadelphia classifies the Grenobles as first class. The California crop he classes second quality but pays more for it. Most of the California quality is second class. Eastern nuts are mostly

third class. I found one in New Jersey which was almost first class.

First quality apples are not grown for the market. They are consumed by the growers. They know the market would not pay for them. They sell mostly the second and third class apples. The present market for nuts is like the apple market. The nut dealer told me to send along nuts, like several eastern samples, and he would sell them, even though they were third quality. He has assured me that if he had the nuts he could sell them.

Investigate every good nut tree you hear about. Very good results may come from this. You don't know what you may learn by doing so. If you will ask about it every time you hear of a good nut tree, good will be accomplished. We are going to keep on finding these trees for the next twenty-five years. Will you help the process along?

Mr. Pomeroy: In the smaller towns, where the grocery men buy of the boys, if they will ask them about the trees from which they get good nuts you will locate many good trees.

Mr. Littlepage: I understand in California they have been planting walnut trees for thirty to forty years but have never yet agreed on the matter of varieties. One of the very practical questions before this association is the determination of the best varieties to set. I would like to hear from some of the members on this question of varieties.

Mr. Rush: I would like to say a word about this matter. We cannot be too severe on quality. We might ask ourselves today what is the matter with the peach crop. The physical changes and conditions are responsible not only for the peach crop, but the nut crop as well. The weather has unfortunate effects on certain varieties of the walnut. So we must make allowance for weather conditions.

Mr. Littlepage: Excuse me for butting in so often. I should like to ask Mr. Rush a question. I highly respect his judgment. If he were planting a walnut orchard of 500 trees in the latitude between Philadelphia and Washington, I should like to know what varieties he would plant and in what proportion?

Mr. Rush: Well, that is a question that would require a little consideration. Now we have some very good varieties. You have a very good variety known as the Holden. I would like to know more of it. One I would choose would be the Nebo, and another originating on my place, and called the Rush, is productive and

good quality and a most excellent pollenizer. We have another fine walnut in Adams County, introduced by John Garretson, from California. Then we have other types, the Lancaster, and the Alpine. Hall, in Erie County is noted for its good size, not strictly a commercial nut. Something like the Holden, Garretson and Rush Parisienne are my favorite varieties.

Mr. Littlepage: I think we are getting some really valuable information now. We must plant the best varieties we have. I think we might start with Mr. Rush's list and have the varieties analyzed. I think this will be of use when we are called upon to advise people.

The Secretary: If I were going to make a choice of the varieties of walnuts, I should name the Franquette, Mayette and Parisienne. Mr. Rush says that his Rush variety is practically a Parisienne. The Garretson walnuts seem to be of these varieties. These have been producing good crops of nuts. It is my opinion that at this time these are the most promising varieties for use in the East.

The President: I wish to say that a tree of the Mayette variety or one greatly resembling it has been living in Pennsylvania for fifteen years and bearing crops. There is little doubt that the Mayette is the best walnut on the market.

Mr. Littlepage: Well, is there anything really surprising, when you consider the origin of these trees? These varieties originally came from the Grenoble district in France. France lies north of the 42d parallel. This is the northern boundary of Pennsylvania and runs through Michigan. But France has a maritime climate.

The President: If I may act as geographer for a moment, there are two things in connection with the foreign climate. The maritime climate is cooler in summer and milder in winter. Over here fungus invasion does great harm but the climate there is detrimental to the fungi and keeps them in subjection. I call attention again to that Mayette in Pennsylvania for sixteen years, as a matter of fact, not theory, an achievement on which we can act with some certainty.

The hour for adjournment has come. This afternoon at 1:30 we have been invited to visit nut trees in the neighborhood in automobiles kindly loaned for the occasion. Tonight at 8 we meet here again.

The Secretary: I want to say a word in regard to Mr. Baker's remarks. The purpose of this association is chiefly educational, but in order that we may be educational, and in order that we may

give the man in the street some definite information, in response to his inquiries, we ourselves must first investigate these matters, such as the question of varieties. This is a point that appeals to me particularly. People ask me what nuts to plant, and how to plant them. We must advise them. One thing that we may tell them is that it is advisable to plant about the grounds high priced, grafted nut trees. It is not advisable to plant high class, grafted trees along fences or roads. They will usually do badly or fail. Grafted trees require careful attention and proper treatment. The proper thing to do along fences and roadsides is to graft the native nut trees already established there, or to plant native nuts abundantly in order that later we may have established nut trees to graft.

Adjournment at 12:30 P. M.

Wednesday Evening Session

The evening session was called to order at 8:40 P. M. by President Smith. The total attendance of the evening was approximately one hundred.

The evening was devoted to two stereopticon lectures, the first being slides by Professor Fagan, illustrating the lecture of the afternoon on the "Nut Survey of Pennsylvania."

This was followed by an illustrated lecture by Dr. J. Russell Smith, President of the Association.

NEW TREE CROPS AND A NEW AGRICULTURE

Presidential Address

Dr. J. Russell Smith, University of Pennsylvania

We have all heard of the scientist who made a discovery and exclaimed, "Thank God! This can't be of any possible use to anybody!" This useless aspect of science in a world with so many possibilities of service does not appeal to me. I hope that science and service and utility may go hand in hand.

The conservation of natural resources, the creation of new ones is a topic which combines the qualities of science, service and utility.

Of all our resources the soil is the most vital. Most of the others have some possibility of substitution, but for the soil there is no substitute. The forest burned to destruction can rise again if the soil remains. Some examination will show that the most vital part of the whole conservation matter is the preservation of the soil,

and that soil conservation is 99 per cent the prevention of erosion. Soil robbery by unscientific agriculture can go to its most extreme lengths and reduce the soil to the depths of non-productivity; but scientific agriculture can, by the addition of humus and some fertilizer, soon restore such soil to high fertility. In these conditions of exhaustion the loss to fertility by soil leaching is small, because of the non-soluble character of the earth particles. Thus experiments at Cornell have shown that in the average foot of top soil from rather unproductive farms in a low state of production, there was plant food sufficient for 6,000 crops of corn. We have all seen a single thunder shower remove from a hillside corn field the fertility adequate for the making of a hundred crops of corn.

American agriculture is peculiarly soil destructive. Three of our greatest money crops—corn, cotton and tobacco—require that the earth shall, throughout the summer, be loose and even furrowed with the cultivator, which prepares the ground for washing away, and by its furrow starts the gully. The second factor in this peculiarly destructive agriculture is the fact of our emphasis of rainfall in summer. Third in the list of factors of destruction is the rainfall unit, the thunder shower, which dumps water, hundreds of tons per hour on every hillside acre. A little examination of the facts and careful inclusion of the time element will show that the old-world saying, "After man the desert" is quite as true in the United States as in Europe and Asia, where it has been so fearfully proven in the seats of ancient empire.

This soil resource destruction from erosion leads to the destruction of other valuable resources. We appear to be upon the eve of an epoch of waterway construction and experiment. The greatest injury to waterways is channel filling by down-washed mud. Pittsburgh has been praised highly for the energetic action of her Chamber of Commerce and citizens in appropriating money for the careful survey of drainage basins above the river, with the idea of obtaining knowledge preparatory to the building of reservoirs to check floods. They have forty-three reservoir sites, and the early construction of nineteen of these reservoirs is recommended.

A part of the reservoir plan, however, is that the land above it shall not be cultivated; otherwise the erosion from the tilled fields will promptly fill up the reservoirs, as the present condition of many eastern mill dams so emphatically attests. The carrying out, therefore, of the Pittsburgh reservoir plan necessitates the exodus of hundreds of thousands of farmers and the restriction of many farming communities to forest or a new type of agriculture.

We cannot spare all this land from tillage. But fortunately, there are other ways of using it. Land east of the 100th meridian may be divided into three classes: First, which in the absence of better estimate covers one third of the area, is hopeless for agriculture because of hills and rocks. This is mostly now in rather poor forests. The second class, also covering one third—by the same estimate—has been cleared for agriculture, but is so hilly and eroded as to be in a low state of fertility and production. The third class, the remaining third of the land, is suited to the plow and should be plowed and cultivated much more intensively than it now is.

For the first and second classes of land we need a new type of agriculture, the crop-yielding trees. Our agriculture, which depends so largely now upon those members of the grass family which we call grains, is the result of accident, not the result of science. At the dawn of history man had practically all of these small grains, which have probably resulted from the selection and seed saving of the primitive woman, as the race came up from savagery into agriculture. This primitive woman in selecting plants for her garden and little field, did not pick out the best of nature, or the most productive, or the ultimately most promising; she picked annuals because they gave the quickest return. And man has left alone and practically unimproved for all these thousands of years nearly all the great engines of nature, the crop-yielding trees, such as the walnut, hickory, pecan, acorn yielding oak, chestnut, beech, pinenut, hazel, honey locust, mesquite, screw bean, carob, mulberry, persimmon, paw-paw, etc., because their slow growth has deterred us from any attempts at improving them. We have depended upon and greatly improved the quick growing grains, which spend most of their short life in putting up a frame work which promptly perishes; whereas the tree endures like a manufacturing plant. Further than this, most of the grains have a period of crisis, during which they must receive water or the harvest is almost a failure. Thus corn must within a short period receive moisture, or it is too late to produce even husks.

Yet trees are the great engines of nature. The mazzard cherry tree, growing wild throughout the southeastern United States, often yields twenty bushels of fruit. Fifty bushels and upwards are often obtained from the mature apple trees. The walnut yields its bushels, the persimmon breaks with fruit.

Europe shows us an agriculture making considerable use of crop-yielding trees other than the ordinary fruits. Mr. C. F. Cook, of the Department of Agriculture, is the authority for the statement

that Mediterranean agriculture began on the basis of tree crops, and there are now about twenty-five such crops in the Mediterranean basin. The oak tree furnishes five, cork bark, an ink producing gall which enters into the manufacture of all our ink, the Valonia, or tannin-yielding acorn, which is an important export from the Balkan states; the truffle worth several million dollars to France; and lastly the acorn. In the Balaeric Isles, I am informed, certain acorns are more prized than chestnuts and the trees yielding them are grafted like apples, and the porker is turned out to make his living picking up acorns where they fall, and enriching his diet with a special kind of fig grown in the same way for his use. We Americans are too industrious; we insist upon putting a pig in a pen and then waiting upon him. The pistachio, the walnut, the filbert and the chestnut are all important tree crops in parts of the Mediterranean countries and many American travelers have probably seen the chestnut orchards of France and Italy, which I have found by examination are able to make the rough and unplowable mountainside, bristling with rocks, as valuable as the level black prairies of Illinois.

The natural objection may be raised that the utilization of so much hilly land in fruit and nut-yielding trees will give such supplies of new food that people will refuse to use them. The above objection is well founded; but swine, sheep and poultry eat what is given them. I have an example of a farmer of Louisiana, who planted a hillside to mulberry trees. The mulberries held the ground in place by their roots and dropped their black harvest to the ground through three months of summer, and the hogs gathered them up and converted them into pork worth $12 an acre, without any effort on the part of the owner. The mulberry area in the United States is probably close to a million square miles. Over most of the region south of Mason and Dixon's Line the persimmon is a hated tree weed; yet it stands by the millions in fields and fence rows, fairly bending down with a full crop of fruit every other year, which is much sought after by the opossum and other wild animals, and eaten when possible by the American porker from September, the end of the mulberry season, until March, for the persimmon has a habit of dropping its fruit through the long winter period. The oak whose acorns probably made the pig what he is, is almost neglected in America; yet for ages the Indians of the Pacific coast have made their bread from acorns of two species of oak, one of which is now gathered by the farmers of California, put into their barns and

bought and sold as stock food. The beechnut and the hickory nut are rich and much prized swine food.

Legumes, of which there are many species, can be grown between nut-yielding trees to maintain the fertility of the soil through the nitrogen gathering nodules upon their roots.

As it often seems desirable to cultivate trees of this character where possible, the tree crops agriculturist is above all others able to adjust his crop and the one device that permits the tillage of hilly land—terracing. Terraces interfere with machinery which is so increasingly essential in the cultivation and harvesting of the present crops. But terracing interferes least of all with the tree crop agriculture, because the trees can stand in the terrace rows and make a fortunate combination of the heavy yielding tree crops and the soil preservation through terracing.

We have an interesting example of tree crop productivity in Hawaii, where the agaroba was introduced from Peru in the last century. It has now spread until it covers considerable area with forests, and information from the Hawaiian Experiment Station is to the effect that it is now the mainstay of the dairy industry of the island. The annual crop of four tons of big beans to the acre can be and is ground into a highly nutritious meal food selling at $25 a ton, an agriculture which, for ease of operation and richness of return, puts Illinois to shame, for, in addition to the $100 worth of animal food, there is a ton of wood per acre every year.

The tree crop agriculture seems to hold the possibility of letting the worst third of our soil (Class 1 as mentioned above) become as productive as the best land (Class 3), while (Class 2) the hill land can probably be doubled in productivity. This is a goal well worthy of much endeavor on the part of the plant breeder.

Tree crops offer equal possibilities for the arid land. The grains with their period of crisis are an uncertain dependence on land of such uncertain rainfall as exists in the United States west of the 100th meridian. This is attested by the fact that some of this land has been settled three times and abandoned twice to the wreckage of hundreds of thousands of private fortunes. Yet the tree with its far-reaching roots and ability to store energy can survive in much of this area where grains are so very uncertain. The mesquite, yet a tree weed over much of this area, has one species which produces a nutritious seed that has been used for bread stuff by unknown generations of Indians. The screw bean, a legume, with a nutritious seed, grows from El Paso to the Imperial Valley; while the broad leafed honey locust, with a seed closely akin to that of the

carob, or St. John's Bread, will also grow over wide areas in the arid southwest. Five varieties of the small but productive wild almond have been found by a Government botanist growing upon the shores of Pyramid Lake; while Frank Myer, Plant Explorer of the Department, brings back from Turkestan accounts of wild almonds producing good fruit on mountain slopes with a rainfall of 8 inches a year. These productive plants, several of them legumes, adjusted by nature to this region, with allied species in other continents, seem to hold before the plant breeder the possibilities of hundreds of thousands of square miles of Western orchard ranges of high productivity, rather than the present would-be grass-ranges of low and declining productivity.

I believe that the development of a tree crop agriculture offers one of the greatest possibilities in constructive conservation of natural resources. Individuals cannot be depended upon to do it. The work is too slow. A man might by decades of work create species that would be, if fully utilized, worth a hundred million dollars a year to a state like Pennsylvania; yet he would be unable to realize personal gain from the results, provided he had secured them. Institutions must do it. It is like the Geological Survey and the Census Bureau and Agricultural Experiment Stations, which depend upon appropriations. The appropriations depend upon the realization of the importance of the work. There are interesting examples of similar work already in operation, of which the following might be mentioned: The Agricultural Experiment Station of Arizona has started a twenty-four-year series of experiments in breeding the date palm. In North Dakota, where the blizzards kill nearly all the ordinary fruits, an experimenter has done much work in the breeding of hardy strains of apple, cherry and other trees.

Then followed a display of lantern slides showing scenes from Spain, Portugal, Balaeric Islands, Sicily, Corsica, Italy, Algeria, Tunis, France and southern and central United States. This collection of pictures revealed a surprising amount of tree crop agriculture already worked out but needing wider application.

The meeting adjourned without discussion of either lecture at 10 P. M.

Thursday Morning Session

The third session of the convention was called to order at 9:50 A. M. with the president, Dr. J. Russell Smith, in the chair. The opening attendance was twenty-eight persons.

The President: Owing to the fact that business needs to be predigested, we have decided to postpone the amendments to the constitution until this evening's session. We think it will take but a short time to discuss them. Resolutions, informal discussion on seedlings, the chestnut, and similar topics will also be brought up at that time. This morning's session, therefore, will be devoted to the intellectual, rather than the business end.

I know of no subject in which there is greater possibility of securing knowledge than the question of nuts for the north. A few years ago a friend of mine wrote me he had bought some land, and was planting native walnuts in the fence corners to be top-worked with English walnuts. I wrote him, recommending oranges instead, telling him he would lose less money. I was basing this advice upon my own bitter experience. The accumulations of nut knowledge in the last few years and the trees now growing on my own place show how ridiculous was my position of a short time ago. This morning I think we are likely to have somewhat similar surprises in a paper by Dr. Morris. He will give us information on the hazel nut, giving his experience with the European varieties.

NOTES ON THE HAZELS

Dr. Robert T. Morris, New York City

The hazels are descended from an ancient and honorable family. Impressions of leaves found in the Upper Cretaceous rocks of the Yellowstone Valley cannot be distinguished from those of the leaves of our two American hazel species of today.

The hazels belong to the *Cupuliferae* or oak family. Our American species are only two in number, although there are many varieties of the species. The one which is most prized, *Corylus americana*, is found over a wide range of territory and abundantly in many places between Canada and the southern extremity of the Appalachians, and from the central Mississippi valley to the Atlantic coast.

This species bears nuts of excellent quality for the most part, but of rather small size and thick shell, excepting in individual

plants. The common American hazel, while valuable for hybridizing purposes, will probably never be cultivated to any great extent, because of its habit of growth.

The characteristic life history in the Eastern States is as follows: A hazel plant bears a few nuts in its third year, a fairly large crop in its fourth year, a heavy crop in its fifth year, a very few nuts in its sixth year and it dies at the seventh or eighth year of age. Meanwhile, the plant has been sending out long stoloniferous roots which have surrounded the original plant with a chaplet of progeny, each one of which follows the life course of the parent.

One hazel plant when left free to its own devices may increase in this way rapidly enough to drive cows out of a pasture lot. I have trimmed off stoloniferous roots experimentally from a number of hazel plants, for the purpose of throwing all of the strength into the original stocks, hoping, thereby, to prolong their lives. This, however, appears not to be effective, as the stocks died at their appointed time.

Like many other wild plants, not yet subjected to processes of cultivation, the common American hazel does not respond very readily to cultivation, and too much attention on the part of the horticulturist leads it into confusion.

Some years ago I expended about six weeks in making a study of fruiting hazels and examined many thousands of bushes in Rhode Island, Connecticut and eastern New York state, including Long Island.

In the regions visited, the native hazels are so abundant as to be considered a pest. Out of all the bushes examined, I saved but three for purposes of propagation. The best one of these for size, quality and thinness of shell, I have named the Merribrooke, and young plants of this variety will be sent to any member of the Association who wishes to cultivate them. Bushes of this particular wild variety have had a reputation among the boys of the locality for more than a hundred years, according to legends of the neighborhood. I have recently budded specimens of this variety upon stocks of the Byzantine hazel, in the hope of prolonging the life of an individual plant beyond its normal seven or eight years.

The other American hazel, variously known as the beaked hazel, tailed hazel or horned hazel, was named *Corylus cornuta* by Marshall (Arbustrum Americanum 37, 1785). Consequently, that is the name by which it should be known instead of the name *Corylus rostrata* which was bestowed subsequently. This hazel has a much more northern range than the common American hazel and I have

seen it in Labrador and in Ontario nearly to Hudson's Bay. On the Pacific coast it is said to reach a height of thirty feet. Although spreading by stoloniferous roots like the common American hazel, these roots are shorter, and it does not extend rapidly enough to dominate the situation when growing in competition with the common hazel.

The nuts, while very good, and sometimes of large size with comparatively thin shell, lack quality, a very important element in any nut. It is probable that this tailed hazel will be valuable for adding hardiness to hybrids with the European and Asiatic hazels, when the time comes for horticulturists of Canada to make fortunes from their hazel orchards.

In Europe and Asia and in the northern parts of Africa several species of hazels are extremely important commercially, sometimes furnishing the chief source of income for large districts, very much as wheat or corn make special crops over large areas in this country.

These foreign hazels have not been raised successfully in our country, excepting very recently on the northwest coast. The reason for failure depends almost wholly upon the presence of a blight, *Cryptosporella anomala*, which belongs to our native hazels. In the course of evolution, host and parasite have come to be peers of each other, and consequently this blight does not menace our native hazels very seriously. Introduced species, with the exception, perhaps, of the Byzantine hazel, appear to carry a protoplasm which has not learned to resist the attacks of the blight. All organic warfare is fundamentally enzymic in its nature, and it is possible that through process of natural selection some of the foreign hazels would eventually become securely established in this country, without aid from the nurseryman.

As a matter of fact, the hazel blight is very easily managed. Not knowing this at first, I allowed almost all of my exotic hazels to become destroyed, and a number of nurserymen told me of having given up the problem as hopeless. Recently I have learned of the ease with which the disease may be controlled, and now feel very comfortable in its presence.

The blight is of slow development and chooses the larger hazel stems for its battleground. All that one notices at first is a depression of the bark extending in the long axis of a large branch. If one observes more closely, he will find spore-bearing pustules occurring as little round elevations upon the depressed part of the bark. The blight proceeds slowly, and I pass about for examination specimens from two hazel limbs. In the smaller one the blight has been

two years under way, and in the larger one three years. These patches of blight were allowed to grow experimentally. Meanwhile, I trimmed out all other blight areas of the bark with my jackknife. This is very readily done. If one will look over his hazel bushes once a year and simply whip out the few slices of bark carrying the blight, it is done so easily and quickly that we now need to have no fear whatsoever for the future of hazel culture in this country.

If the members of the Association will examine these Cryptosporella specimens which are passed about, and if they will dispose of the blight according to directions, I feel that the hazel question involving a matter perhaps of millions of dollars worth of investment has been settled.

Among the foreign hazels which will thrive in this country the Byzantine hazel, *Corylus colurna* is by all means the most beautiful. It makes a tree as large as the ordinary oaks, and in Hungary I have seen a trunk three feet in diameter at a short distance above the ground. I have been told that a single tree of this species will sometimes bear about twenty bushels of nuts at a single crop. This presumably refers to the nuts in their large involucral mass,—say four or five bushels of husked nuts. The wood of these species is hard, takes a high polish and is valuable. The tree itself is strikingly beautiful as the members will observe this afternoon when examining the Byzantine hazels which Superintendent Laney will show us in one of the Rochester parks.

This species of hazel in some of the localities about the Black Sea is said to form almost the entire source of income over large districts. The nuts are not large, as a rule averaging about like those of our common American hazel in size, quality and thinness of shell. Grafted or budded stocks may be made to bear large thin-shelled nuts. I am using this hazel at present for grafting stock for choice foreign species and varieties of other kinds, and for the American hazel, although it may be that the American hazel will not respond well to so large and vigorous a stock in the long run. Nuts and nursery stock may be obtained through French nursery firms.

The reason why the Byzantine hazel has not been planted widely in America as yet, is because we have not advanced that far in civilization,—people have not happened to think about it. We must leave something for the people who are to come five thousand years after us, and not think of all good things at once.

The Byzantine hazel appears to be quite free from the blight and

this, perhaps, is due to its thick corky bark, which is in itself an attractive feature. In some individuals the corky bark stands out in ridges almost like that of the corky elm. The beauty of the European and Asiatic hazels, in general, makes them extremely desirable for ornamental purposes in parks and in dooryards.

One of the most attractive is the purple variety of *Corylus avellana*. In many parts of Europe this is held to be desirable for its nuts, but in Connecticut it is prone to flower so early in the season that the elongated male catkins are caught by frost. I have seen elongated catkins in a warm week at the end of February. A very desirable variety of *Corylus avellana* is one of which I now show specimens. The section of the branch which I pass about carried four large nuts yesterday but I find that one of them has disappeared, and it is probable that last night in the sleeping car a squirrel got in when the porter was looking the other way.

The specimen represents a seedling individual among a lot presented to me by Prince Colloredo Mannsfeld of Bohemia nine years ago. This particular shrub is rather homely, with small unattractive leaves and big bony branches, but it bears heavily of large thin shelled hazels of the highest quality, and the sort which are now bringing fifty cents per pound in the New York market as green hazels. It blossoms very late in the spring. I have not as yet given a name to this individual bush, but as Professor J. Russell Smith caught my description of it and speaks of it as "the bony-bush" we will allow his nomenclature to stand if members of the Association wish to call for any of the wood for grafting or budding purposes. *Corylus avellana* in its many varieties is the chief European hazel which gives us the cobnuts and filberts of the market, and it is the one which will probably be most widely introduced into this country. The name "filbert" is a corruption of "full beard" and is properly applied only to those nuts in which the husk extends beyond the nut. The shrubs of this species commonly reach a height of about fifteen to eighteen feet, with a spread of the same dimensions. Trimming by the horticulturist allows of the development of a larger bearing surface, very much as it does with peach or apple trees.

In some parts of Europe this species serves for hedge fences, indicating the practical ideas belonging to an older civilization. In this country we make hedge fences of worthless osage orange, privet, or honey locust which steal nourishment from the soil, add little to the beauty of the landscape, and give us no return whatsoever. Such a typical American way of doing things will be changed when

we stop to think. Stopping to think is rather a painful process and gives us many jolts, but it has its rewards. When we replace our worthless hedge plants with hazels which yield heavy annual crops of valuable nuts we shall have made one step forward.

A fine hazel is the *Corylus pontica.* The shrub in itself has beauty, and it bears nuts sometimes as large as those of the average shagbark hickory. The kernel is of good quality, but the shell is so thick that these nuts are chiefly attractive to squirrels and to men who are out of work. I do not know the origin of the nut which is known in the market as the Barcelona hazel, but I imagine the plants bearing this nut are derived from the *Corylus pontica.* (Specimens of branches and nuts of various species and varieties of hazels are now passed about in the audience.) The nuts are beginning to ripen in this first week in September.

Hazels do not come true to parent variety from seed, and consequently valuable stock is propagated by budding, by grafting or by layering.

Personally, I find that the hazel is rather easily budded, although layering is the method for propagation of choice varieties most often employed in Europe. The hazels have comparatively few insect enemies, but mine are sometimes attacked destructively by the elm beetle and by the larvae of two species of saw flies which are also found upon the elms. It is a rather curious fact that the insects should recognize a similarity between the leaves of the hazels and of the elms, which are somewhat alike in general appearance, although the trees are of widely different descent.

It brings up an interesting question, if the flying parents of the parasites from the elm are attracted by the appearance of the hazel leaves, or if they are attracted by the odor or other characteristics. Occasionally the exotic hazels are attacked by various leaf blights but not to any troublesome extent so far as my experience goes, up to the present time. The chief predatory elements which we shall have to meet when raising hazels are squirrels, white-footed mice and the neighbors' children.

W. C. Reed: May I ask, Doctor, what you bud the Byzantine on?

Dr. Morris: I am budding other things on those for stocks. I bud our American hazels and European hazels on the European and Asiatic trees.

Mr. Rush: Do you know anything of the quality of that nut?

Dr. Morris: It is the chief hazel in parts of northern Turkey,

and of excellent quality. Hazels form a source of income for some localities like the wheat or corn in other parts of the world, or the olive, as Dr. Smith told us last night.

Mr. Holden: Do they get these trees from seedlings?

Dr. Morris: Yes, so far as I know. The nuts are called Constantinople nuts.

A Member: What kind is it that blooms in the fall?

Dr. Morris: I don't know any but the witch hazel which blooms in the fall; has a small yellow flower, but is not a true hazel. Catkins form upon all hazels in the fall, but these do not really blossom until springtime.

A Member: I would like to ask if the Byzantine hazel is attacked by blight as are the others?

Dr. Morris: No; none of my trees have been attacked by blight at all as yet.

W. C. Reed: What method of budding do you find most successful?

Dr. Morris: I have usually used the ring budding. It is not very difficult.

Professor Hedrick: Are there any East Asia hazels that thrive in this country?

Dr. Morris: There are specimens in the park here at Rochester that you will see this afternoon.

Professor Hedrick: Our experience with Asiatic hazels is very satisfactory.

Mr. McGlennon: A friend of mine here has some specimens that he would like to present.

Dr. Smith: We will ask Mr. Vollertsen to describe the specimens himself.

Mr. Vollertsen: They are from a private place of G. H. Perkins on East Avenue. They have never failed a year since 1886. Unfortunately we have no name for them, except that this one was always called John Jones. It has certainly proved a good strong hardy variety.

Then we have another one, a long one, which has never been named, and I am not able to say exactly what it is. Last year they were exceptionally well filled. This year there are not quite so many on them, although a goodly number. They have never failed a single year.

I have one little variety which was given me by Dr. Mann, on Alexander Street. The limbs are practically hanging down with the nuts. They are ready for market now, falling out.

I have here some purple hazels which have always borne fruit and no other hazel in the vicinity is as good. It has sometimes two crops in a year. These are really beautiful specimens. This little early variety should be passed round and have special attention. I have given this variety no name, but for over thirty-five years it has borne good fruit every year.

Dr. Morris: If you are in doubt as to the name of a variety, I think Mr. Laney will find a way for getting you the name for almost every variety that is found in the markets.

The President: Mr. McGlennon asks that the gentleman advise us how he has propagated them. We went through Mr. McGlennon's beautiful orchard yesterday.

Mr. Vollertsen: We have been using an ordinary way of budding. An ordinary seedling can be used to good advantage for grafting. I have found in grafting in winter they do not seem to grow as well. In our fall layering we naturally get a larger plant.

The President: Do we understand that these hazels that have borne for twenty-five years are European hazels?

Mr. Vollertsen: Yes; European hazels. I have had them under my care since 1886, and never noticed any blight.

A Member: Can't you explain to us, with one of your specimens, your method of spring layering?

Mr. Vollertsen: In layering them we practically don't cover them at all for the time being. They are merely pinned down.

Dr. Morris: Do you cut the bark?

Mr. Vollertsen: Not on them. After they have grown some we cover them up. We find this a very successful way. We get younger and smaller plants in the fall lay.

The President: I should like to ask Dr. Morris a question. In this native hazel, does it keep on spreading under ground?

Dr. Morris: One single plant, planted in a pasture lot and not interfered with will in a few years occupy practically that whole pasture lot. In my part of the country this is true; how is it with you, Dr. Deming?

A Member: Going back to the blight, will this tackle any size limb?

Dr. Morris: It usually does not come until your hopes are at top notch, and then it drops in on you. It does not attack the smaller twigs at first, but may finally extend to them.

A Member: Are any of your hybrids a success?

Dr. Morris: There are none in bearing as yet. Byzantines are little, if any, larger than American hazel nuts, excepting from

selected trees. Pontines are much larger. Both plants make a remarkably vigorous growth.

THE PRESIDENT: Do I understand that this Merribrooke hazel, put in the middle of an acre will fill the acre?

DR. MORRIS: I believe this is true. I don't think it is an exaggeration. The wild hazel is a nuisance in Connecticut.

THE SECRETARY: I know they will cover a very large space, but I cannot tell how they get there.

THE PRESIDENT: The point I am trying to get after is this, not the exact extent of spread but the method of propagation. Can we get a sprout from a good tree, and then have it go on sprouting indefinitely?

DR. MORRIS: Yes, that is true.

A MEMBER: In your experience are fungicides useful in handling the blight?

DR. MORRIS: I have not used them. I have talked with nurserymen who did, and they say the blight got the best of them just the same. They left the matter with employees, who did not give proper attention. This was perhaps because they did not know that a small jack knife was better than a spraying outfit for the purpose.

A MEMBER: Once on, will it stay?

DR. MORRIS: Yes, until the blight area has circled the limb.

A MEMBER: What is the difference between the cobs and the filberts?

DR. MORRIS: The cob nut is generally a round nut. The filberts are longer nuts. "Filbert" is a corruption of "full beard," and refers to the involucre extending beyond the nut.

DR. SMITH: We may now proceed to the next number on the program, if the hunger for hazel knowledge abates. Members of this association have topworked pecans, hickories, etc. I followed the instructions of members of this association in my work and have had some success. Some workers report splendid success mixed with very great failures, so we may be encouraged to the very top notch, and the next spring we come back feeling very different. Last fall I was as large almost as a beer barrel with the gratification that followed the setting of 100 English walnut buds. I have adopted the motto "Blessed is he that rejoices early, or he may not rejoice at all." In March there were about ten or twelve alive. In June about nine were alive, and now these also have failed to grow. Last year I knew just how to bud walnuts. This last Fourth of July I was very humble.

For some reason or other we have not all the facts. We can propagate splendidly one year, and the next year we have a fall-down. Mr. Roper, of one of the pioneer nurseries, said he had 2,000 fine live walnut buds last fall, and had but 500 this spring, and not one of them grew. While the technique seems to be simple, there seems to be something lacking in our experience. I will ask Mr. Littlepage to give us his confessions first.

Mr. Littlepage: The proposition of topworking is one of the schemes where art beats nature. In the fight in Congress over the oleomargarine bill some years ago, one member who favored it, said in support of his contention, that nature always beat art; and one of his opponents immediately referred him to a picture gallery near, where pictures of the statesmen were exhibited, as a proof that art sometimes beats nature. In top working, art improves upon nature.

The first thing to be considered is what is topworking, and then the logical question, why topworking. Possibly this should come first. If an individual is dissatisfied with his friends and neighbors, he must put up with them; he cannot change them. But if he is dissatisfied with a nut tree, it is his own fault if he does not change it. It can be top worked. He does not care to top work maples or oaks. We only top work to get something better than we have. The trees, of course, that interest us specially in top working are the nut trees. We have seedling pecans, seedling walnuts, seedling hickories, and seedling chestnuts. Down at the mouth of Green River in Kentucky are nearly two hundred acres of wild pecan trees. So far as we know there are only two trees in that orchard worthy of propagation. Of thousands of trees there we have propagated only two varieties. These trees are now too large to top work, but had it been possible 150 years ago to go in there and select the desirable nuts, and topwork all the other trees with these, there could have been a great orchard there now of the highest quality nuts.

Topworking consists in cutting off the top of some undesirable seedling and replacing it with scions or buds from some desirable variety. It is just the same as any other grafting or budding process. Almost any size tree can be topworked but, of course, the larger the tree the more difficult the operation. A young tree, from two to five inches in diameter, can be sawed off four or five feet above the ground and topworked by grafting from two to four scions on it, by the slip bark process. If the tree is larger than five inches in diameter, it is better to go up to the first branches, saw off part of them and proceed just as if each branch were itself a small tree. If the tree is a large tree, with a number of branches

or prongs, it is best to work part of them one year and leave the remaining branches to maintain the root system. It would probably kill a large tree to cut the whole top off at one time. I have seen trees, two feet in diameter, successfully topworked. It sometimes happens that the scions placed in the tree, in the spring, for some reason or other, do not grow. The tree then sends up nice green shoots that later in the season can be budded into just as if they were small seedlings. The wild black walnut trees, growing around the fields and hills, can all be very easily topworked to the English walnut by the slip bark method. The scions must be dormant and the tree starting into active growth.

The wild hickory, wild pecan and wild black walnut trees, offer the best field for profitable work along this line. We have topworked a great many hickories to pecan, but we do not expect permanent satisfactory results. The experience of the pecan on the hickory is not very satisfactory. The hickory is a dense, hard wood, that has a short growing season, and matures its nuts early; the pecan is of the coarser, faster growing wood, whose nuts grow until late in the fall. This inconsistency of the growing habits of the two trees prevents the pecan top on the hickory from producing normal crops of nuts. The pecan topworked to the pecan, however, is a perfect success and there is no reason why the wild hickories of all descriptions cannot be successfully and profitably topworked to the better varieties of the good shagbark hickories. I believe that there are great opportunities in the state of New York for successful nut culture by utilizing the wild black walnut trees and the hickories. I have seen hundreds of English walnut trees growing around Rochester, some of them bearing perfectly wonderful crops of walnuts. I am surprised that the people in this section have not availed themselves more of the opportunities along this line. If the farmers in this section would take up nut growing as a side proposition and set five or ten acres of nut trees on each farm, they would soon find that these nut trees would be producing them more than all the balance of their farms. We hear a great deal today about the back to the farm movement, but my opinion is that for everyone who is going to the farm, ten are leaving it, and the reason for this is that the heavy operating expense of the annual crops, such as corn, wheat and potatoes, etc., lay such a heavy toll on the farmer that farming is not profitable. The requirements of time, labor and money in producing these crops are so great that it discourages many farmers. I have made the statement to some of the farmers in my part of the country that they must produce alfalfa or go

broke. I believe that alfalfa and tree crops will be two of the greatest factors in the rehabilitation of the farm, especially the nut trees, for the reason that nut trees do not require the same high degree of care, spraying, pruning, as do apple and peach trees, nor are the products as perishable. A crop of nuts can be harvested and stacked up in barrels, and boxes, in the smoke house, the barn or in a flat car and go to the market tomorrow, next week or next month.

Recurring to the advantage of topworking, however, it meets the objection that is often raised by those who say they have not time to wait for the nut trees to grow. Of course, this is a perfectly foolish statement; they are going to wait anyhow; it is simply a question as to whether they wait for something or nothing, and trees grow into maturity in a surprisingly short time. A few years ago, when I was setting out an orchard of nut trees, a neighbor of mine came over and looked very doubtfully with a trace of pity in his expression and said, "When do you expect all those trees that you are setting to bear?" I replied, "I am not sure, but I do know that they will bear a long time before those trees that you are not setting." Topworking, however, gives quick results and enables one to take advantage of the long-established thrifty root systems of the wild black walnuts, hickories and pecans growing in economic spots, around the fences, corners, creeks and hillsides.

Mr. Jones: In all our grafting we cut the cleft; we don't split it. The slip bark method is better in some cases.

Mr. President: What is the size limit for the slip bark method?

Mr. Jones: Anything less than two inches we would cut.

The President: Will Mr. Jones tell us about budding with cold storage wood?

Mr. Jones: The cold storage buds would take better, but you would have more loss in their failing to grow. In other words, a much larger percentage of buds set with the current season's growth, will grow in the following spring. I would not recommend either method alone. By grafting in the spring and then budding, first with cold storage and later with the season buds, you would have three chances.

The President: Have you budded any cold storage wood before this year?

Mr. Jones: We have done more or less of it for six or eight years, and it has been successful. Anyone with very little experience can use cold storage buds.

The President: Mr. W. C. Reed, have you any additions that we ought to know?

Mr. W. C. Reed: Mr. Jones' method and views in regard to cold storage buds agree with mine exactly. Last year I put in on July 30th quite a number of English walnut buds that were held in cold storage. In the fall we seemed to have almost perfect stands from these buds, but they are still lying dormant. Buds of the season's growth put in about three or four weeks later gave better results, although our success last year was very poor. We seemed to have a fair stand on quite a number of varieties, but this spring they refused to grow. I lay much of this trouble to the extreme cold we had in November. This killed many peach trees that were from six to eight years old, and I think it injured many of the walnut buds. I found the buds that started best were those nearest the ground, where they were protected by a little grass.

In regard to the topworking of the English walnut, several of you have seen my trees, the three trees along the highway in a ditch where they catch the wash where they have made $9\frac{1}{2}$ feet growth. I am sorry to report that two of these trees are entirely gone, killed by the cold spell, and the other is about half alive, but I was not in the least discouraged by that loss. In September the rains commenced, following the extreme drouth and started a second growth, and the freeze caught them November 22d as full of sap then as they were in September, when you were there.

Other trees that I had topworked had made a moderate growth, and were not injured in the least. They made a good growth this season, and should be quite fruitful next year.

The Pomeroy trees in the bluegrass pasture had made only a moderate growth, and went through the winter in good shape.

I had three trees of the Rush, probably twenty-five feet high. They were injured a little, some of the growth killing back a third of the way, and one or two buds were killed entirely.

In regard to topworking pecans, I have not done much of this, but our success has been very good with what we have tried. I find them much easier to work, as far as the bud starting in the spring is concerned. Some varieties, however, do not start readily. With the Major, Green River, and one or two other varieties, we can use wood five, six and eight years old, and have it come out all right. I find, however, that the current season's growth, cut from two-year-old trees, well developed, will give you at least double the growth in the nursery the first year that older or dormant wood will.

THE PRESIDENT: Some apple experience of mine is a close match to the killing that Mr. Reed just reported. The season of 1912 was a very dry one. All September it rained frequently and heavily. The trees waked up and grew with such speed that many of them made a sappy growth where they had been manured, and a very cold spell early in the winter killed 100 of them. Others across the road were uninjured.

MR. W. C. REED: In regard to grafting in the nursery, this spring my experience has been somewhat varied. In grafting we started about April 10th; the first grafting was almost an utter failure. On May 1st it improved. On May 9th we set 900 and have 75 per cent growing today, some higher than my head. Set with wood some of which would run three-fourths inches in diameter.

LADY DELEGATE: My sister has on her place 200 or 300 black walnut seedlings. What would you advise her to do with these? They are in all ages and stages of growth, from one to ten years.

MR. LITTLEPAGE: That is a very broad question to answer. I should topwork them to the Persian walnut. I should topwork all of them on the chance that future developments would leave them the proper distance apart. The walnut transplants very easily, except that the larger the tree, the more danger of loss. Trees of that size ought to be worked very nicely.

Assume that this is your tree, and that you have sawed off the top. Here is your scion from your desirable tree. It is to be cut on one side only, and there is considerable art in making that cut true. Then with the knife split down the bark on the stock a little way and shove the scion down between the wood and bark, the cut side next to the wood of the stock (demonstrating), and cover with waxed cloth. Then apply grafting wax to the cut surface, and cover all with a paper bag for two or three weeks. There should not be more than two buds on a scion. Don't leave too many. One bud is better than three, but you may leave two buds. This scion must be kept entirely dormant until used. Any time after the bark will slip readily is the proper time to graft, and you will then get a high percentage of success. Keep your sap circulating to the top by putting two or three scions around the top of the stock. This method of grafting is a very simple operation when you know a few little fundamental facts about it. The kind of wax or cloth is not particularly important. Mr. Reed and Mr. Jones and Mr. Rush have had much experience in this work.

MR. PARISH: In doing this, shall we put in a little air hole?

Mr. Littlepage: No. In from ten days to two weeks tear a little hole in the paper bag. Next time be careful, for it may be full of wasps. The purpose of that paper sack is to keep the water off the buds. This is essential.

Mr. Phillips: I had about 300 trees planted in 1911, black walnuts. In 1913 I budded them according to the Oregon method. I failed to make any of these grow. In 1913 I cleft grafted and a great many of these started, but they all failed to live. I wonder wherein I failed.

Mr. Littlepage: No one can tell why a particular scion does not live. I had scions from a very fine hickory and I put them in cold storage. The wood was in perfect condition. I grafted perhaps 100 of these scions as I have described. I have four trees growing out of the 100 grafted. In handling the wood I got fungus on it probably. That may be one reason why it failed. There may be other reasons. If the scions were not dormant that might explain it.

Mr. W. C. Reed: I think it is very important that walnut grafting wood should be cut before severe weather in the winter, though I don't think it ever grows cold enough to hurt pecan wood. You need not worry about pecan wood, but in the case of the walnut it should be cut before extreme cold weather and put in cold storage. I cut some last year after the extreme cold snap in December and we threw it practically all away this spring. It is useless. You are throwing away your time to use it.

Mr. Jones: I don't think we had any wood that was not injured during the cold winter of 1911–12. Out of about 2,600 grafts set we had two grow.

Question: What do you mean by cold storage?

Mr. W. C. Reed: I have been storing all of our wood in ordinary apple cold storage plants. Pack it in damp moss or excelsior. Paper line your boxes well, and nail them up, and leave them there until you are ready to use them. I have put wood in in November and taken it out in good shape in August. Pecan wood can be held the year round.

The President: What can you tell us, Mr. White, that has not yet been covered?

Mr. Paul White: About all I would care to say about topworking would be to ask a question. They claim that the pecan topworked on the hickory, only bears for a few years, and then stops. What would be the result in the case of the English and black walnuts? Might there not be some danger there?

The President: I have made considerable investigation of

this. I have found several English walnuts topworked on black walnuts, one done eighty years ago down in Maryland. The tree is reported to have borne twenty-five bushels of nuts. I think there is good explanation for the pecan-hickory trouble. A hickory grows for a short time in early summer and does not grow much, but a pecan grows twice as much. Therefore the hickory roots cannot feed the pecan top enough to make both vegetation and fruit. We are, in this city, in a very unusual place. Not only is it the center of a great wealth of seedling Persian walnut trees, but we have in the parks a great tree collection under Superintendent Laney. This is a very fine and notable collection, including American and foreign trees, some of which we will see this afternoon.

Adjournment at 12:12 P. M.

Photographs of the convention were then taken on the steps of the City Hall.

Thursday Evening Session.

Convened at 8:20 P. M., Dr. Smith presiding.

Attendance about twenty.

A Nominating Committee was appointed, consisting of Messrs. Littlepage, C. A. Reed, J. F. Jones, Webber, and Teter.

At this point was given the address by C. A. Reed.

AN APPEAL TO OWNERS OF HARDY NUT TREES

C. A. Reed, Nut Culturist, U. S. Department of Agriculture, Washington, D. C.

Ever since the colonists first established themselves in the Western Hemisphere, nut trees have been planted up and down the Atlantic Coast. One of the species oftenest included in such planting was a walnut, a native to Persia which, with Romanism, had spread across Europe and the channel into England. In the Old World it had variously been known as Jove's nut, under the supposition that it had once been the food of the gods; Royal nut, meaning King nut; and by other common names which would be interesting to discuss but which are not pertinent in this connection. In England it had been known merely as the "walnut," but in the New World, in order to distinguish it from the walnut found here, it was called the "English" walnut. In the trade today it is commonly known by the Old World name, other walnuts being distinguished from it by prefixing their common names, as Eastern,

California, Mexican or Japanese black walnut, etc. However, being a native of Persia, it was long ago decided that the correct name of this nut should be "Persian" walnut, and not "English" walnut. As such it has now been referred to in scientific publications for well towards a quarter of a century.

Subsequent to this rather limited and scattered planting on the Atlantic Coast, by perhaps three hundred years, the Persian walnut put in its appearance on the Pacific Coast. According to Bulletin No. 231 by the University of California, it is probable that occasional trees were planted in that state long before the discovery of gold in 1848. Following that date, planting became much more general, but usually with hardshell strains and always with seedling trees. From these early trees the crops were never of great importance. In 1867 Mr. Joseph Sexton of Santa Barbara, planted a sack of walnuts bought in the markets of San Francisco, which he had reason to believe had been grown in Chili. Of the resulting trees some were very good, others mediocre, and some worthless. Later on, nuts from the best of these trees were planted, and second generation seedlings produced. In this way the famous Santa Barbara Papershell type of walnut was evolved. With it developed an industry which among the tree products of southern California is now second only to that of the orange. In 1910, the census takers found that in the year preceding, the crop of walnuts of southern California, which, by the way, came almost entirely from four counties, was valued at more than that of the total crop of all other nuts grown in the United States put together.

Four years after Mr. Sexton of southern California had planted this sack of walnuts from San Francisco, Mr. Felix Gillet of Nevada City, in northern California, began the introduction of French walnuts both by seed and scions. Out of his efforts and those of others who subsequently joined him, developed the walnut industry of northern California, which now bids fair some day to equal that of the lower part of the state. The famous French varieties of Franquette and Mayette were introduced by Mr. Gillet, and from seedlings of his growing evolved the Concord, the San Jose, and no doubt the Chase varieties.*

A nut which probably has received equally as much, if not more, attention at the hands of experimental planters in this part of the country is the chestnut. Just when the introduction of foreign strains began, history seems to have failed to make clear; but ac-

*Bulletin No. 231 by Prof. Ralph E. Smith of the University of California, is authority for this history of walnut introduction into that state.

cording to Powell* general dissemination in the Delaware section began with introductions by Eleuthers Irénée du Pont de Nemours, made at about 1803. It is said that some of the original trees planted at that time near the present site of the du Pont Powder mills by Mr. du Pont, still survived when Mr. Powell recorded their history in 1898.

The spread of both European and Japanese chestnuts and their general trial throughout the Eastern States has been narrated at former meetings of this association. The chestnut blight, discovered on Long Island in 1904, after it had apparently gained several years' headway, and which now seems fairly certain to have been introduced from Japan, has so monopolized the attention of orchardists, foresters, landscape gardeners and others interested in the chestnut that for the time being little is being done with it, other than to study and discuss this disease. What the final outcome will be no one can predict, but it is not improbable that our pathologists will discover some practical means of control, or that a natural enemy to the blight will appear. Nor is it unlikely that immune strains of chestnuts, either native or foreign, will replace our present groves and orchards, in case other efforts fail.

Another nut which has received a large degree of attention at the hands of the planters and upon which hopes have been built from time to time is the hazel, or filbert. Here again, history seems to have failed us, for as yet the writer has been able to learn but little regarding the early introductions into this country. In his *Nut Culturist*, published in 1896, Mr. Fuller (A. S.) reasoned that at that time plants of the European hazels must have been grown in the gardens of this country for at least a hundred years. Writers on pomology make little reference to this nut, but according to Mr. Fuller, nurserymen's catalogs listed hazel varieties all through the early part of the last century. It was believed that the hazel promised much for the gardener and the general planter who wished for early returns. The species seemed capable of readily adapting itself to cultivation, and being a shrub rather than a tree, it required little space. It could be cultivated along with other garden products at little additional expense for labor. Being an early bearer it doubtless appealed strongly to the normal American demand for quick returns.

Nevertheless, this nut met with its mortal foe in the way of a native fungus which in a great many sections has proved entirely

* G. Harold Powell, Bull. XLII, Delaware Agricultural Experiment Station, 1898.

too much for the European species. Where once this species was well represented up and down the Atlantic Coast, few of its representatives are now to be found.

Some early attention in these Eastern States has been paid to the almond, another foreign species. It is supposed that this nut is a native of the Mediterranean basin. Just when it was first tried on the Atlantic Coast is not known, but of the nuts thus far mentioned it has proved to be the least promising for the Eastern section. Sometimes said to be "as hardy as the peach," it has been found to be the most exacting in its requirements of soil and climate of any important nut now grown in this country. Except with certain of the hardshell varieties, no almonds are now known to be in any sense successful east of the Rocky Mountains. According to Wickson (E. J.) in his *California Fruits*, the almond is known to have been introduced into California previous to 1853. At that time efforts to build up an almond industry on the Pacific Coast began to assume a somewhat serious air. After a half century of trials and more or less persistent effort by the California planters the culture of this nut has developed into the third most important nut industry in the United States. As for the time being, the growing of Persian walnuts centered in southern California, so did the growing of almonds in the Sacramento Valley of northern California.

During the whole of this period of early American nut growing history, little attention in any part of the country was paid to the native nuts. However, in the southeastern part of the United States there existed a large portion of the country to which no choice species of nut trees were either indigenous or had been introduced. Necessity, curious interest, and, more probably intelligent purpose, prompted sea captains, plying from West to East Gulf Coast ports, Easterners returning home from visits in the West, Westerners visiting in the East, and no doubt nomadic bands of Indians, to carry pecans from the Mississippi River and beyond, to the coast of Mississippi, to Alabama and the South Atlantic States, where they were planted as seed. For fully a century the species gradually spread over the plains sections of the eastern Gulf and South Atlantic States. In 1846, according to Taylor (William A.) in the Yearbook (Department of Agriculture) of 1904, a Louisiana slave succeeded in grafting a number of pecan trees. So far as can now be learned, really intelligent interest in pecan culture began with that date, although history records no further successful propagation of the species until about 1882 when William Nelson began to

propagate this variety in his nursery near New Orleans. Soon afterwards, C. E. Pabst of Ocean Springs, Miss., and E. E. Risien of San Saba, Texas, joined in the pioneer work. The late Col. W. R. Stuart of Ocean Springs soon took part by giving publicity to the early varieties. Gradually, but steadily, choice varieties developed, were propagated and were disseminated. Orchard planting followed, but did not assume great importance until since about 1905. The orchards, therefore, were still too young at the time the last census was taken to have been in bearing to any extent. However, the crop of pecans from the native forests and from single trees left standing in the open space where the forests had been cleared is shown by the census reports to have been the second most valuable of American nut crops in 1909.

In quantity, the production of cultivated pecans is still slight in comparison with that of the wild product or with cultivated walnuts and almonds of the Pacific Coast. Just now, however, a great many of the orchards, planted this century, are beginning to bear and not improbably the production of cultivated pecans will soon eclipse that of the forest product, and before long will overhaul the lead now held by the Persian walnut.

Thus, briefly, has been the separate history of the principal nuts of this country. Collectively, the history of American nut culture has been as follows: Nuts from foreign countries which have been under cultivation for centuries have been more inviting than have the native and undeveloped species, and so have received the major portion of attention in America. Then too, human nature has shown itself in the greater interest taken by nut planters in foreign nuts instead of those near at hand. It is in sections remote from their place of origin that many of the leading nuts have attained their greatest degree of perfection. Thus, the average pecan of the Atlantic Coast is distinctly superior to that of the western Gulf; the Persian walnut scarcely known in Persia is best known in France and in southern California.

Progress has been slow and not concerted. Seedling trees have been planted under the firm conviction that they would come true, or because methods of propagation other than by seedage were not understood.

The Persian walnut orchards of California from which today the bulk of the production is being realized, are of seedling trees. However, the Californians have learned their lesson and today are replacing their orchards with budded stock as rapidly as possible. They have found that while the Persian walnut, which for cen-

turies has been grown from seed, will reproduce itself fairly true to type, it does not repeat true to variety. Every tree, no matter how carefully its parentage may have been guarded, is unlike any other. The seedlings differ in traits of vigor, hardiness, susceptibility to disease, time of beginning to bear, productiveness, and longevity, and the nuts vary in size, form, thickness of shell, ease of cracking, and in kernel characteristics.

The people of California have also found that in many ways, Persian walnut trees on their own roots are less desirable than are those budded or grafted on the roots of some black walnut.

The earliest pecan planters likewise set seedling trees, partly because no others were available, but more largely because of a supposition that such seedlings would come true. Later on, planters chose grafted trees of large varieties, irrespective of others' merits or demerits. Today, the orchards of both seedling trees and illy-selected varieties are being topworked at great expense of time, labor, and money.

In the northern and eastern part of the United States, the situation until very recently has been one of practical standstill. Efforts with foreign nuts have resulted in our being but little ahead of the starting point of a couple of centuries ago.

The great majority of the Persian walnut, chestnut, and hazel trees which have been tried have failed us; some have even brought fatal or near-fatal diseases to us.

At first thought, we would feel compelled to abandon all further efforts with the foreign nuts; but not all that have been tried are guilty of offence or failure. Here and there, from New England to Michigan and from Maryland to Missouri, we are finding occasional nut trees either in groups or standing singly, which because of their age, vigor, productiveness, and quantity and quality of nuts, appear to be fit foundation stock for the varieties so much needed in this part of the country. A number of such are being propagated by the nurserymen and, as the members here present know, are being disseminated.

The present great need is for knowledge regarding the location of other such trees, not only of the foreign species, but of the natives as well. The Northern Nut Growers' Association and the Federal Department of Agriculture at Washington together are seeking to find Persian, Japanese, or black walnut, Asiatic, European or American chestnut, European or American hazel, and native butternut, hickory, pecan, chinquapin and beech trees of more than ordinary merit. Upon the locating of, and the propagation from such trees,

as new varieties, apparently depends the future of nut growing east of the Mississippi and north of the Ohio and Potomac Rivers.

The appeal therefore is made to the owners of hardy nut trees that they drop a postal to the Department of Agriculture at Washington, D. C., stating that they desire a mailing box and frank for sending in a few specimens of the nuts which they believe to be of more than average merit. The only expense necessary to incur will be in the price of the card, and in the trouble of collecting and packing the nuts. Before mailing, the package should be plainly marked with the name and address of the sender, and a note should be inclosed giving information regarding the location, ownership, bearing habits, etc., of the tree from which the nuts were obtained.

If more convenient, the nuts may be sent to this association, which in any case will be apprised by the Department of all new varieties of apparent merit which may be brought to light.

However, no one should anticipate a great fortune as the result of any nut tree of which he may find himself the owner. It is not possible for a variety to be of especial value, no matter now promising the parent tree may appear to be, until it has established proof of its adaptability and merit in other sections remote from that of its origin. Except in rare cases it has been only after a variety of any kind of fruit has become well known by many who have tested it and spoken for it that it has become popular or in great demand.

Therefore, all there will be "in it" for you, if you chance to be the owner of a nut tree of merit will be the thanks of this Association and posterity and the probability of having the variety named in your honor.

Mr. Littlepage: I should like to drop a word about the *American Nut Journal* published here at Rochester, N. Y. I would like to ask all the members of the Association to make as much effort as they possibly can to get new subscribers to the *Journal*. I don't own any stock in it, but I am talking purely in the interests of nut culture. Without a magazine nine tenths of our work would be entirely useless because it would be lost to the public. One of the duties of the members should be the support of the organ which puts forth the information for which this organization stands.

The President: Methods of propagating pecans, hickories and walnuts have been discovered and used, at times, for a century. I know of a man who grafted them twenty years ago in New Jersey, but he left no records of his methods. The *Journal* helps us to keep these records.

This association has a great variety of contributors. We have

with us men who work on the exceedingly practical end of propagation. W. C. Reed is a combination of the student and the propagator.

HISTORY, DIMENSIONS AND CROP RECORDS OF PARENT NORTHERN PECAN TREES, AND NOTES ON THE OBSERVATION OF PROPAGATED TREES

W. C. Reed, Vincennes, Indiana

Varieties

In considering varieties of the northern pecan, there are many points to be estimated, such as size, thinness of shell, cracking quality, quality of kernel, growth of trees in nursery and bearing records. The latter is perhaps most important. What we want are trees that will give us a fair crop annually; next would be the cracking qualities. If they crack easily and come out of the shell with a large percentage of whole meats the size does not make so much difference, for ultimately the value of a variety will be gauged largely by the number of pounds of whole meats a bushel, or a given number of pounds, will produce. I would therefore place prolific bearing and cracking qualities as the two most important points to be considered in selecting a variety worthy of planting.

Crop Records

In considering crop records of the different northern varieties, we have no grafted or budded trees old enough as yet from which to make comparisons, and in considering the crops of the original trees it is well to keep in mind that many of these trees are located in the native forest without cultivation, without proper sunlight and with a poor chance for the full development of the tree; also it is well to remember that scarcely two trees have the same surroundings and conditions, and that it is not often that the owner is able to secure the entire crop from any one tree, being located in the forest where a large part of the crop is carried off by others. With these conditions it is often impossible to tell what a certain tree may yield, except by comparison with former crops. In giving you these yields I am giving my own knowledge so far as I can, and then information and estimates from the most reliable sources at my command.

Indiana

This variety is perhaps the best known (owing largely to its name), and has not failed to produce at least a partial crop annually for the past fifteen years. Since it has been under close observation,

which has been about seven to eight years, it has usually borne from 100 to 300 pounds. Often a large part of the crop has been stolen. Crop 1912 about 200 pounds; 1913, 250 pounds; 1914, I am confident would have been 300 pounds. The owner secured 125 pounds; balance carried off by others. This year, 1915, is almost a failure; just a light sprinkling of nuts; was full of blooms but owing to heavy cold rain, failed to pollenize. The tree is located in a cultivated field, circumference of tree is 5 feet, height about 60 feet, spread 50 to 60 feet.

Busseron

This is almost identical with Indiana, and the owner tells me has borne as many as seven bushels to twelve bushels at a single crop. The tree being very tall, the entire top was cut out of it a few years ago and it is just now commencing to bear again. The lower limbs, however, of older wood that were left, have borne annual crops. In the nursery this variety has shown a tendency to very early bearing; most one year trees, spring 1914, set full of catkins, and one tree produced 16 well-developed nuts. These, however, dropped during the extreme drouth of August. The past spring most Busseron trees in the nursery again set full of catkins and at the present time we have one tree, coming two years old from bud, bearing one nut that is full grown and looks as though it would mature during the next thirty days.

Several other varieties have set full of catkins in the nursery row but have not developed any pistillate blossoms. The Busseron has furnished much propagating wood and at the present time there are, perhaps, more trees growing in the nurseries of this than of any other northern variety. Crop of 1915 promises to be fairly good.

Niblack

Crop of 1912, 100 pounds; crop 1913, about 50 pounds; crop 1914, 225 pounds; crop 1915, I would estimate at 100 pounds. This tree is very deceiving; the top is rather open and the nuts are usually scattered all through. The crop of 1914 was not considered heavy until after it was gathered. The past spring this tree bloomed very full, but owing to wet, cold weather when in full bloom did not set well. Size of tree 18 to 20 inches in diameter; 50 to 60 feet high with 40 feet spread, and is located in a cultivated field.

Posey

Crop of 1914 was 125 pounds saved; this tree is about the same size as the Niblack, located in the edge of a cornfield near heavy

timber, being far from any house. A large part of the crop is often stolen; the crops of 1911 and 1912 were not so heavy, perhaps 50 to 75 pounds. It usually bears a fair crop, however, but I do not consider it a heavy cropper like the Indiana or Niblack. Its large size and splendid cracking qualities, however, will make it a popular variety and it may prove to bear much better on budded trees under cultivation.

Butterick

This giant tree stands out in the open field, measures 14 feet in circumference, 90 feet spread and perhaps 100 feet high, and usually bears from 5 to 7 bushels. The owner tells me he has owned this tree for forty-four years and that it has not missed more than two or three crops during that time and that the former owner told him he owned the tree for fifty years and that it was a good sized tree when he bought the farm and bearing regular crops.

Major

Crop 1912, 160 pounds saved, and from what information I can get this tree usually bears 100 pounds or more; tree about 3 feet in diameter, 120 feet high and 60 feet to first limb. Owing to its height and size it is very hard to get much of an estimate in regard to the crop it may carry until after it is gathered. Being located in the dense forest a large part of the crop is often carried off.

Greenriver

Tree is located in the same grove with the Major, is about 3 feet in diameter, 35 feet to first limb, crop 1912 reported 260 pounds and has not missed a crop in twelve years. Have had no report for 1915.

Kentucky

Crop 1912, $4\frac{1}{2}$ bushels; since that has borne good crops, but do not know the exact amount, but fair crop this year. The owner says it has only missed two crops in twenty years.

Warrick

This tree bears very regularly, but owing to the fact that it has been cut so severely for propagating wood has not made any heavy yields the past few years. The old wood has heavy crop this season.

This practically covers the named list of varieties for the Indiana pecan belt. I might say, however, that most of the native trees are bearing a very good crop of pecans this season in our country.

Observations on Propagated Trees

The Busseron has shown a stronger tendency to early bearing than any other variety. The Major and Greenriver seem to be the best growers in the nursery, with very heavy foliage. The Posey makes a very stocky tree but seems to be one of the most difficult to propagate.

Southern Varieties

The summer of 1914 we had the Stuart, Delmas and Schley. The first killing frost was a severe cold snap; mercury dropped to 10 above zero, November 22d. Foliage on these perfectly green as well as the nuts. The Stuart seemed to have about matured fruit although foliage was green. Husk on nuts had burst open ready to drop. The fruit which looked to be ripe, however, when cracked, the kernel looked plump, but when cut open was found pithy and more like a piece of cork.

Stuart tree bearing this season nuts at present, September 1st, only half grown, while Busseron alongside in nursery row is full size. The northern varieties usually mature ready to gather October 1st; the Indianas in the jar on the table were gathered September 28th last year.

High Land versus Low Land. Pecans in High Land

There have been a number of articles written by men well posted claiming that the pecan will not bear or thrive except on the cultivated bottom lands of our valleys and streams. The writer wishes to disprove this erroneous idea. It is not borne out by facts. On the farm of W. J. Coan of Bruceville, Knox County, Ind., there are a number of pecans planted from ten to fifteen years ago. Part of these trees are on bottom land and part on high land. This high land is heavy clay underlaid with considerable hardpan. The writer visited these trees two weeks ago and has photographs showing four trees in a group that were planted fifteen years ago that have borne for the past six years, each crop getting better. At the present time I would judge they are bearing at least one bushel to the tree. A single tree in the barnyard has not made the growth owing to the compact soil around it. However, it has borne quite heavily, commenced bearing at nine years of age from seed. The trees on the bottom land are not as large and have not borne half as many nuts as the ones planted on high land. This is Mr. Coan's report and he says that were he planting again he would plant entirely on high ground. The trees shown in these photographs are located on perhaps the highest elevation in Knox County, Ind.

There are a number of other trees near the writer's home planted on high land 150 feet above the river, back from three to six miles, that are large trees, measuring 18 to 24 inches in diameter and bearing regular crops. Heavy clay land seems to push a stronger and more vigorous growth than does the more loamy, darker soil. I submit here a number of photographs taken August 10 of pecan trees in the nursery row, budded one year ago, showing a growth of from 4 to 6 feet, many of them 5 to 7 feet and some 8 feet high and still growing rapidly. These were budded on four-year-old pecans.

Propagation

We have tried all known methods of propagating the pecan with varied results; one of the methods you do not want to try is the Edwards method. While it may be a success in Texas, where it originated, it is a miserable failure in the North. Grafting above ground is done after the sap is well up, and gives fair results. However, best results have been obtained by the patch bud method on seedlings three to four years old. Good strong seedlings, well-ripened buds cut from the scion orchard or from trees two years old in the nursery have given best results—in some cases, as high as 85 per cent stand the past season.

Mr. Jones: Mr. Rush had a Stuart bearing last year in southeastern Pennsylvania. The nuts were not very large but they matured fairly well. I am more encouraged than ever that the Indiana variety will be safe for use in Pennsylvania.

Mr. Reed: I think that if the Stuart bloomed as early as the others it would be all right, but it is about two weeks later.

Mr. Littlepage. I don't believe in the Stuart very much: I have better pecans myself, hardy in the north.

The President: I wish to corroborate Mr. Reed's point about the success of the pecan on high land. One man is, I believe, responsible for that widely circulated statement that the pecan will grow only on alluvial land. I have travelled a thousand miles in investigating that fact, and found it a fallacy. Some of the biggest pecan trees I have ever seen were growing at 900 feet elevation down in Georgia. This was on clay hills. I have seen the same thing in Raleigh. That alluvial soil business is a hoax.

This ends the intellectual side of our program.

Business meeting.

Meeting adjourned *sine die* at 10 p. m.

WALNUT OBSERVATIONS IN CALIFORNIA*

L. D. Batchelor, University of California, Citrus Experiment Station, Riverside, California.

The walnut industry of California is just entering a transition period from the planting of seedling groves to the established plantings of grafted trees. Just as other seedling fruit trees, such as the orange, apple, peach, almond, etc., have been eliminated, so too, the seedling walnut groves of California seem doomed to be replaced by clonal varieties. In many ways this industry is as much in its infancy as the apple industry of New York was sixty-five years ago, when varieties first began to be propagated in a commercial way by grafting and budding. This readjustment in the walnut industry is well started, and, although it is likely to be gradual in its evolution, and wisely so, the change seems nevertheless certain. There are but a very few seedling trees for sale at the present time by the progressive nurseries, and, in fact, only a very few such trees have been set out in groves during the past four or five years. The demand for grafted trees has been brought about largely by the wide range of variation in walnut seedlings as regards their productivity, commercial value of the nuts, season of harvest and ability of the trees to resist the walnut blight.

In view of the very recent propagation of the walnut by grafting, which has extended over only about ten to twelve years, it is reasonable to expect that the majority of the varieties thus propagated so early in the development of the industry are only partially suited to the needs of the walnut grower. The nuts from many of these grafted varieties fall considerably short of the commercial standard for high-grade walnuts. Some of the heaviest-bearing sorts, such as the Chase, Prolific and El Monte, produce nuts that cannot be sold in the very best grade of the commercial product. On the other hand, the Placentia, which produces one of the most nearly ideal commercial nuts, is not a heavy-producing variety, especially in the northern walnut sections, and is quite as susceptible to walnut blight as the average seedling tree. Again, the Eureka variety, which seems to successfully avoid the walnut blight during many seasons by its lateness in coming into bloom, is a very moderately

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yielding variety in the southern sections. The above examples are only a few of many that might be cited to show the shortcomings of most of the varieties of walnuts now being propagated.

The wide range of climatic and soil conditions makes the eventual propagation of quite a large number of varieties inevitable. While the coast regions are bathed in fog nearly every morning during the growing season, the inland valleys experience an extremely dry climate with high maximum temperatures. Walnuts are being grown at the present time on soil types varying from the extremes of sand to heavy clay loams. Many of the future varieties must be especially adapted to some one of these particular environments if they are to stand the test of time.

Many of the present seedling groves are of uncertain origin and represent greatly varying values. No doubt some of these groves are the progeny of especially selected trees known to have considerable merit. On the other hand, it is very apparent that many of them are the result of a great demand for seedling trees when the industry was in its infancy twenty or thirty years ago. At that time without doubt, great quantities of walnuts were planted without due regard for their parentage. Again, there is a wide range of variability among the individual trees of any grove, as variations in type of tree, blooming season, character of foliage, resistance to disease, productivity and character of the nuts.

Type of Tree

The tree types vary from the upright, sturdy individual to the more or less spreading, weeping types which droop nearly to the ground under the burden of the crop. The upright, vigorous growing type is well exemplified in the Eureka. On the other hand, such varieties as the Prolific have a spreading, bushy habit and an almost semi-dwarfness characterizes their growth.

Blooming Season

It is not unusual to find the blooming season in an ordinary seedling grove extending over a period of from a month to six weeks. A few individual trees leaf out and blossom with the first signs of spring. Then the great majority of the trees in the grove come out in full leaf. But there are frequently trees still leafless after the nuts on the early individuals are of the size of a marble. This variation in the blooming season has considerable economic importance in relation to the harvesting and marketing of the nuts as well as the avoidance of diseases and frost which may be more prevalent during certain periods in the spring.

Foliage Characteristics

The character of the foliage varies from the broad-leaved types, whose foliage somewhat resembles that of the horse-chestnut, to the narrow-leaved varieties whose leaves have a tendency to curl up like the foliage of the Winesap apple. The broad-leaved types are much more densely foliated and this factor has considerable bearing on the problems of sun-scald on the twigs and trunks of the tree and the exposure of the nuts to this injury. For this reason, the densely foliated varieties may prove best adapted to the inland valleys, where the difficulties of sun-scald are most prevalent. The more sparsely foliated types often appear to have less blight on the nuts and leaves because of their exposure to the sunshine.

Disease Resistance

Probably one of the most important limiting factors in walnut production in California, and especially in the older walnut sections, is the bacterial disease commonly known as walnut blight. The inroads of this disease have caused a very heavy dropping of the nuts during many seasons of the past, and although a great deal of time and scientific effort has been devoted to the control of the trouble, there is no satisfactory known means for the prevention of walnut blight at the present time.

It is a well-known fact that in the vegetable kingdom closely related species suffer in different degrees from the attacks of the same parasite. This difference in resistance is often as marked among different varieties of the same species as between the species themselves. The absence of blight is not necessarily an indication of immunity. There is a great deal of difference in the amount of blight prevalent at the present season in the different walnut growing sections. Again, the immunity from blight of a particular tree for one season may be followed by more or less prevalency of blight on the same tree the next season. The degree of resistance must be tested out through a number of years before any variety can be pronounced resistant to this disease. The observations must also be carried out in different localities as certain varieties seem to behave differently on different soils and when growing under different climatic conditions.

Some varieties seem to avoid the blight the majority of the seasons but really have little or no resistant qualities when the seasonal conditions and the growth of the plant happen to coincide with the most favorable time for the spread of the disease. An example of this is seen in the Eureka variety the present season. While this

variety has maintained a reputation during a majority of seasons for freedom from blight, during the present year the Eureka is badly diseased in certain sections of Orange County. This may, perhaps, be explained by the prevalence of damp, cloudy weather for about a week or ten days during the first of May when this variety was in full bloom. In one grove under observation the trees were thought to have lost at least 50 per cent of their blossoms soon after blooming. At the present time on these same trees, 32 per cent of the nuts are afflicted with more or less blight. To be sure, some of these will likely mature, but the appearance of blight on nearly one third of the crop shows that this variety has very little resistant power against walnut blight. Its freedom from disease in the past has no doubt been due largely to its dormancy during the most favorable weather conditions for the spread of blight.

The field for the selection of blight resistant varieties must necessarily be in the badly blighted sections. A tree with only 10 per cent blighted nuts in an orchard having an average of 70 per cent to 80 per cent may really be more resistant to blight than a variety which appears to be positively free from the disease when growing among trees which are only 15 per cent to 20 per cent blighted. In making observations and selections, therefore, it is quite as important to know the amount of blight on the surrounding trees and the grove, as a whole, as it is to know the prevalence of blight on the selected individual. The extreme variation of different seedling trees in their susceptibility to this disease is well illustrated in some of the following observations which were made the present year. The percentages which follow the varieties named were determined by counting at least 100 nuts on a tree just before the blighted nuts began to drop. In a seedling grove in the Whittier district about 300 trees were examined and 100 nuts counted on each tree. The individual trees varied from 2 per cent to 85 per cent blighted nuts, while the grove as a whole averaged 25 per cent. There were at least a dozen or fifteen trees in this grove which were blighted less than 10 per cent, although some of the nearby trees were blighted as high as 60 per cent or 70 per cent.

Another seedling grove in Orange County which was counted in the same way, averaged 47 per cent blighted nuts during the second week in June. In making this determination 105 trees were examined. In this same grove, there were, however, at least three trees which averaged less than 6 per cent blighted nuts.

It is interesting to know that the Placentia variety, growing within a stone's throw of the aforementioned seedling grove and under identical cultural conditions, was blighted to the extent of 71.9 per cent on the same date.

Observations of the Prolific (Ware's) in the vicinity of the above mentioned grove, showed less than 1 per cent blighted nuts on the trees and practically none of the nuts have dropped to the ground at the present time, yet in the past this variety has not had a reputation for disease immunity. The original Chase tree was observed during this time and showed a percentage of 37 per cent blighted nuts. These examples are given neither in support of any particular variety nor to discredit others, but are noted merely to call attention to the wide variation, and this variation is a great source of encouragement in our endeavors to produce a disease resistant variety.

Of course blight immunity is not the only factor to be considered in selecting a variety of walnut. A profitable yield of good commercial nuts is the real test of the superiority of any variety. A very heavy yielding tree with a small amount of blight may prove more profitable than a light yielding variety that is totally immune to this disease.

The production of a medium grade nut which would grade only as a seedling No 1, might prove more profitable if the tree is at least partially blight immune than the production of such a high grade nut as the Placentia with its susceptibility to blight. These things must be considered and weighed carefully by the growers who are planting walnuts in the blight sections. The various areas where walnut blight is not a factor might profitably sacrifice heavy production to superior quality.

From our present knowledge it is very apparent that the disease resistance of individual trees varies considerably from year to year and under different soil and climatic conditions. The thorough testing of resistant varieties will require considerable time.

Nut Characteristics

The character of the nuts is as variable as the trees themselves, not only in the exterior appearance, but in the character of the meats as well. The ideal commercial nut should be of medium size, about one and one-eighth to one and one-half inches in diameter, of regular oval form somewhat elongated, with smooth surface, and light brown color, and uniform for these characters. The cracking quality of the nuts is quite as important as their exterior appear-

ance. The nuts should be well sealed so they will not crack open in shipping. The shells should be thin but strong, so the nut may be easily opened and the whole meat taken out intact. The pellicle surrounding the kernel should be light tan colored or silvery brown with a glossy waxed appearance attractive to look upon. The meat should be smooth, and plump, averaging 50 per cent or more of the total weight of the nut, and with a mild, pleasant flavor, free from any astringency.

The shells vary all the way from extremely rough and unattractive specimens to the smooth commercial type, as the Placentia, while the color of the meats varies from dark brown to nearly white, and so on through the other characteristics mentioned.

In the selection of varieties the walnut breeder is exceptionally favored by the occurrence of large areas of seedling trees. According to the 1910 census there were in the neighborhood of one and a quarter million seedling trees growing in California. With this almost unlimited material for selective use, it seems indeed reasonable that many varieties will be selected in the future which are better adapted to the demands of the industry than some of those now being propagated. By means of hybridizing methods it is also hoped that some of the desirable unit characters of the varieties now in cultivation may be recombined into more nearly ideal varieties for future generations. The fact that walnut breeding is necessarily a long-termed, expensive problem has made it rather unattractive to the practical breeders. Such work will depend largely upon public or specially endowed institutions for its support.

PRUNING THE PERSIAN WALNUT

J. G. Rush, West Willow, Pa.

Pruning is as old as horticulture itself, but the Persian walnut has escaped this treatment thus far. Practical experience, however, in growing these trees for fruiting, shows the great importance of systematic pruning. It is a common occurrence to see a young tree with straggling and irregular growths. Very frequently we see that growth takes place on part of the tree only, leaving the other part undeveloped, which would throw the tree very much out of balance in course of time. Pruning should begin early in the life of the young tree and as soon as it leaves the nursery the pruning shears should be in evidence.

There are two important objects in view in proper and systematic pruning. First is form, with a well balanced head. Second, to increase productiveness by having more lateral branches properly distributed all over the tree. As a matter of course productiveness will follow.

It is a singular fact that a misfortune can sometimes develop into a blessing. Last year, 1914, was an unfortunate one in that an early and late drouth caused poor bud development, and, of course, they were not in a condition to withstand our usual winter weather.

In the spring of 1915, as soon as bud development took place, I commenced to prune. I cut off all weak branches to a strong bud and sometimes went over the trees a second time in order to insure that the work should be well done. These trees referred to are mostly three years old and at that age the pruning should be done very systematically.

It is a mistake to have a tree three or four years old in bearing. You will have branches from 2 to 4 feet long without any laterals, quite differently from other fruits, as the apple, peach, pear, etc. If these long branches are allowed to remain you will find that the terminal buds will develop nuts and weigh down the branch. But with proper management the life and productiveness of the tree can be improved by pruning. A branch 3 or 4 feet long should be cut back one half. Of course great care must be taken where the cut is made, for the future welfare of the tree.

I have a very fine five-year-old Hall variety on my side lawn that

shows the neglect of proper pruning at the right time. The branches are entirely too long and drooping. In order to overcome this defect I will have to cut back to two-year-old wood and force the dormant buds for the future tree.

There is another great advantage in the proper method of pruning the young Persian, that is, that the finest kind of bud wood becomes available.

You will please remember that in pruning the walnut we are not pruning for color as with other fruits.

The tree should be as round headed as a Norway maple, and if some of the limbs should show indications of weakness by crowding then cut them out for the benefit of others close by.

REPORT ON NUT GROWING IN CANADA

G. H. Corsan, Toronto

Not being able to meet with you this September, as I have to go down to the State of Mississippi, I send this paper to your president whose paper on the Garden of Eden we all read in the *Country Gentlemen* of July 7, and so much admired.

Progress has not been made on my place sufficient to warrant my inviting you to Toronto next convention, but I will say that the year after next I will certainly have something worth seeing. But Dr. J. H. Kellogg of Battle Creek, Mich., extends an invitation to you to hold the next convention at the Battle Creek Sanitarium where nuts and nut preparations are used exclusively in the place of meat and fish and fowl. Here at Battle Creek on Dr. Kellogg's private grounds and on the Sanitarium grounds may be seen Colonel Sober's Paragon chestnuts, Mr. Pomeroy's English walnuts and Mr. Reed's grafted pecans, as well as some grafted persimmons of named varieties. In my statement in the *American Nut Journal* last May or June I mentioned that all the grafted persimmons sent from Washington were winter-killed. I find on returning in August that the Early Golden is very much alive. Twelve other varieties have been planted to see what this winter will do to them. The persimmon is exceedingly interesting to us northern nut growers because where it will succeed the pecan will also, without a doubt. Now I also find that my statement in the same paper that the grafted pecans sent by Mr. Reed were winter-killed was an error, as only certain trees failed to grow above the graft. Those that are growing are the Major, Busseron and Indiana, the Busseron showing most decidedly better than the Indiana, both here and at Toronto. All pecans lived, both here and at Toronto, if I include those that sprung up below the graft. Out of thirteen varieties that I experimented with at Toronto, Major, Posey and Niblack were the only ones that lived well above the graft and showed no winter-killing. Others were more or less winter-killed. Kentucky, Mantura, Appomattox, Luce and Greenriver showed no desire to live in the north. Mr. Pomeroy's English walnuts showed a most distinct dislike for Toronto, but all forty-eight are doing well here and are being cared for.

Colonel Sober's Paragon chestnuts showed the most determined

attempt to not grow the Paragon part of the tree, and an equally determined mind to grow good and strong below the Paragon part —may this part yield good trees! I have three or four Paragons left out of 135 trees. Pecans grew as many as four feet both here and at Toronto this summer.

Of the new trees sent from Washington two specimens of Castanea Crenata (from the north Island of Japan), six specimens of Castanea Mollissima (almost blight proof, from north China) all are thriving.

Juglans regia sinensis lived to the tip through the winter and budded out strong from the top, as did J. cordiformis—may it always be so.

Re Dr. Deming's question as to the farthermost northern pecans I said Charles City, Iowa. Now these forty trees were planted twenty years ago and are all alive and yield corps, but the nuts are small as they are seedlings. Write Mr. Charles D. Patten *re* how his trees are doing and their history. He has been asking Mr. Reed for scions of better trees.

I have five types of soil to grow my trees in, stiff clay, rich gravel, quicksand and humus, light sand and silt or bottom land, well drained. I have no sour, undrained spot on my fifteen acres.

APPENDIX

PRESENT AT THE SIXTH ANNUAL MEETING OF THE NORTHERN NUT GROWERS ASSOCIATION

Henry T. Brown, Rochester
Mrs. McLean, Rochester
Rev. A. C. Crapsey, Rochester
Prof. Fairchild, University Rochester
Chas. E. Bunnell, Rochester
S. W. Taylor, Stamford, Conn.
Herbert E. Ingram, 432 4th Ave., New York
Dr. J. W. Jackson, Dansville, N. Y.
Martha Rush, New Providence, Lancaster Co., Pa.
Edna Mylin, Willow St., Pa.
Paul White, Boonville, Ind.
J. G. Rush, West Willow, Pa.
J. F. Jones, Lancaster, Pa.
John S. Parish, Eastham, Va.
Thos. P. Littlepage, Washington, D. C.
Dr. and Mrs. Wm. C. Deming, Georgetown, Conn.
Ralph T. Olcott, Rochester
Dr. Robt. T. Morris, New York City
Dean Baker, Syracuse, N. Y.
E. R. Angst, Wilmington, Del.
H. L. Grubbs, Fairview, Pa.
M. E. Wile, Rochester
Harry R. Weber, Cincinnati, Ohio
Frank A. Bailey, Rochester
E. E. Streeter, Rochester
C. K. Sober, Lewisburg, Pa.
W. C. Reed, Vincennes, Ind.
M. P. Reed, Vincennes, Ind.
Dr. J. Russell Smith, Swarthmore, Pa.
Mr. and Mrs. C. A. Reed, Washington, D. C.
Carl J. Poll, Danville, Ill.
Walter C. Teter, New York City
Jas. S. McGlennon, Rochester
Conrad Vollertsen, Rochester
H. L. Reynolds, Canandaigua, N. Y.
Prof. and Mrs. F. N. Fagan, State College, Pa.
Jas. Rissew, Macedon, N. Y.
J. C. South, Rochester
R. L. Fitzgerald, Rochester
H. M. Brown, Fairport, N. Y.
Nellie Doty Butts, Barnards, N. Y.
H. Goodall, Spencerport, N. Y.
John Rick, Reading, Pa.
W. A. H. Reider, Reading, Pa.
Adelbert Thompson, East Avon, N. Y.
Mr. and Mrs. A. C. Pomeroy, Lockport, N. Y.
Daniel Pomeroy, Lockport, N. Y.
Howard Pomeroy, Lockport, N. Y.
C. C. Laney, Rochester, N. Y.
John Dunbar, Rochester, N. Y.
E. B. Holden, Hilton, N. Y.
Mr. and Mrs. B. S. Abrams, Charlotte, N. Y.
Henry Hohener, Rochester, N. Y.
Dr. Charles Forbes, Brick Church Institute, Rochester, N. Y.

PROGRAM FOR AUTOMOBILE TRIPS SEPTEMBER 1ST AND 2D, 1915

The program below is intended as a guide only. It may be necessary on account of conditions to vary this. It is therefore highly important that all automobiles follow one another along the lines later designated in this sheet.

On the afternoons of September 1st and 2d, we propose to drive in automobiles to the various trees of interest in the immediate neighborhood of Rochester. The limit of the trip on September 1st will be Hilton, N. Y. The present plan is to visit the trees in the following order:

1—230 Saratoga Avenue, Persian Walnut seedling;
2—Kramer, Emerson Street and Lake Avenue, Persian Walnut (This is the parent tree of the Thompson Grove seedlings at East Avon, N. Y.);
3—Riverside Cemetery, Hybrid Hickory Laneyii (tree named after Mr. Calvin C. Laney, Superintendent of Parks, Rochester, N. Y., by Dr. Sargeant of the Arnold Arboretum);
4—Westgate farm, Stone Road, Persian Walnut seedlings and filberts (nuts for the seedling trees and filbert bushes imported from England);
5—W. H. Anderson and Wm. Twitchill, Ridge Road, seedling Walnut (of these one tree 105 years old);
6—Hilton, N. Y., Holden trees, from which the Holden Walnuts originated;
7—McGlennon Nursery, Denise Road, filbert plantings, two years old;
8—Clifford Avenue, between St. Paul Street and Clinton Avenue North, seedling Walnuts;
9—Spiegel Park, seedling Walnuts;
10—Culver Road and Parsells Avenue, Hybrid Walnut and Butternuts.

(End of trip September 1st, 1915)

September 2d, 1915

1—Gregory Street, McGlennon Nursery, filberts;
2—Highland Park, Hazel;
3—West Brighton, Mrs. W. J. Miller, seedling Walnuts;
4—Golah, N. Y., King Nut Hickory;
5—Seedling Walnut grove, Adelbert Thompson, East Avon, N. Y.

All automobiles intended to convey members of the Association will have a sign "Northern Nut Growers Association." All cars will follow a pilot car, which will be plainly marked. There will be one relief car, which will be plainly marked, and will carry no passengers except in emergency. In the event of any break-down in an automobile, the emergency car will immediately pick up the passengers of the one delayed, and transfer its sign to the delayed car. The delayed car, after repairs, will act as a relief car in its place.

The start of both trips will be made from Powers Hotel at 1:45 P. M. All members are requested to be on hand promptly, as the several stops will consume considerable time. Unless delay in starting is provided against, the trip may be prolonged beyond a comfortable limit.

Local Committee

Ralph T. Olcott
Supt. C. C. Laney, Park Dept.
Asst. Supt. John Dunbar, Park Dept.
M. E. Wile
Mrs. W. D. Ellwanger
James S. McGlennon
W. Robert Bruce
John Hall, Secy. W. N. Y. Hort. Soc.

EXHIBITS

Corylus cornuta	Beaked Hazel	Branch	Dr. R. T. Morris
Corylus avellana	European Hazel	Stem showing blight	Dr. R. T. Morris
Corylus colurna	Byzantine Hazel	Branch	Dr. R. T. Morris
Corylus avellana	Purple Variety	Branch	Dr. R. T. Morris
Corylus pontica	Pontine Hazel	Branch	Dr. R. T. Morris
Corylus avellana	Var. Barcelona	Branch	J. G. Rush
Corylus americana	Var. Rush	Branch	J. G. Rush
	Long Hazel		Joseph Risseu Walworth, N. Y.
	Round Hazel		Joseph Risseu, Walworth, N. Y.
Hicoria ovata	Var. Taylor	Nuts	Dr. R. T. Morris
Hicoria ovata	Var. LeFevre	Nuts	J. G. Rush
Hicoria ovata	Plate	Nuts	Miss Ruth N. Reeves Newark, N. Y.
Juglans regia	Var. Alpine		Miss Ruth N. Reeves, Newark, N. Y.
Juglans regia	Var. Nebo		Miss Ruth N. Reeves, Newark, N. Y.
	Rush		Miss Ruth N. Reeves, Newark, N. Y.
	Hall		Miss Ruth N. Reeves, Newark, N. Y.
Juglans hybrid	supposed J. regia X cinerea		Miss Ruth N. Reeves, Newark, N. Y.
Juglans regia	Var. Holden spec.		E. B. Holden, Hilton, N. Y.
Juglans cathayensis		Foliage	Park Board, Rochester
Juglans rupestris		2 clusters, 4 nuts each and foliage	Park Board, Rochester
Juglans sieboldiana		cluster 7 nuts and foliage	Park Board. Rochester
Pteryocarya stenoptera	False Walnut	Foliage	Park Board, Rochester
Castanea sativa	Var. Paragon	Branch with one very large bur	J. S. Parish, Eastham, Va.
Castanea pumila	Common chinquapin	Branch with cluster of nuts	Dr. R. T. Morris
Castanea pumila	Southwestern chinquapin	Branch with nuts	Dr. R. T. Morris
Panel with general collection of pecans, hickory nuts and walnuts. W. C. Reed, Vincennes, Ind.			
Juglans nigra	Var. Rush	Nuts	J. G. Rush
Juglans regia		Branch	Mrs. B. S. Abrams, Latta Farm, Charlotte, N. Y.

RESOLUTIONS

PASSED BY THE NORTHERN NUT GROWERS ASSOCIATION IN SESSION AT ROCHESTER, N. Y., SEPTEMBER 1 AND 2, 1915

No chestnut stock should go out unless it is thoroughly sterilized by some satisfactory method and tagged by proper authority to show that fact.

States that are still clear of the blight are advised that effective quarantine is desirable to delay, for a time at least, the spread of the blight. Four infestations of chestnut blight have been found in Indiana in July and August, 1915. This fact, and the continued spread of this fatal fungus, are some of the reasons for this recommendation.

* * * * *

Nut trees may and do sometimes come fairly true to type but they do not come true to variety. Consequently our association does not approve of the sale of seedling trees under variety names; and this association further recommends to all journals that they take no advertisements for nut trees if such trees are not sold under conditions that clearly comply with the provisions of this resolution.

BIBLIOGRAPHY OF THE YEAR.

The Chestnut Bark Disease on Freshly Fallen Nuts. J. Franklin Collins. Reprinted from *Phytopathology*, Vol. V, No. 4, August, 1913. With One Figure in the Text.

Melaxuma of the Walnut, "Juglans regia." (A Preliminary Report.) Howard S. Fawcett. Bulletin No. 261, Agricultural Experiment Station, Berkeley, California, November, 1915.

The Pecan Business. From Planting the Nuts to Gathering the Nuts. Catalogue of B. W. Stone, nurseryman, Thomasville, Georgia, containing cuts and information about pecan growing in the South.

Proceedings of the Fourteenth Annual Convention of the National Nut Growers Association, held at Albany, Georgia, October 27–29, 1915.

Report of the Proceedings at the Sixth Annual Meeting of the Northern Nut Growers Association at Rochester, New York, September 1 and 2, 1915. (In press.)

Walnut Aphides in California. W. M. Davidson. (Professional Paper.) Bulletin of the United States Department of Agriculture No. 100, August 31, 1914.

The Possibilities of Nut Growing in the East. W. C. Deming. *Women's National Agricultural and Horticultural Association Quarterly*, August, 1915.

The *Walnut Book and Horticultural Digest*, A Monthly Publication Devoted to the Production, Distribution and Consumption of the Walnut. Vol. I, No. 1, November, 1915. The Walnut Book Publishing Co., Orenco, Oregon. One dollar a year. Official Organ of the Western Walnut Association.

Nut Trees for the Country's Waste Places. Gilbert E. Bailey, Ph. D. University of Southern California. *American Fruits*, July, 1915, p. 8.

The Inside of a Graft. F. A. Waugh, *The Country Gentleman*, February 20, 1915, p. 328.

Progress of Nut Culture in the East. Possibilities of a Coming Industry. W. C. Deming. *The Rural New-Yorker*, March 6, 1915, p. 327. Illustrations of methods of budding and grafting nut trees.

Air and Wind Dissemination of Ascospores of the Chestnut-Blight Fungus. F. D. Heald, M. W. Gardner, and R. A. Studhalter. Reprint from *Journal of Agricultural Research*, Department of Agriculture, Washington, D. C., March 25, 1915. Vol. III, No. 6.

Grafting and Budding the Walnut. E. R. Lake. Weekly News Letter to Crop Correspondents, United States Department of Agriculture, Washington, D. C., April 7, 1915. Vol. II, No. 35. Numerous cuts.

Neglected Northern Pecans. Dr. J. Russell Smith, University of Pennsylvania. *Country Gentleman*, January 9, 1915.

Riehl Fun for Nuts. Dr. J. Russell Smith, University of Pennsylvania. *Country Gentleman*, October 9, 1915.

A Georgia Tree Farmer. Dr. J. Russell Smith, University of Pennsylvania. *Country Gentleman*, December 4, 1915.

Shade Trees that Bear Nuts. Dr. J. Russell Smith, University of Pennsylvania. *Country Gentleman*, January 7, 1916.

Grafting Nut Trees. Dr. J. Russell Smith, University of Pennsylvania. *Country Gentleman*, January 28, 1916.

Edwards & Patterson's pecans, actual size, sent to us as fair average samples of nuts grown on unblasted and blasted trees. The pecan at the top was grown on a tree in unblasted soil,—at the bottom is the pecan grown where the soil was blasted.

"NO, we would not think of planting a tree without using dynamite."—

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